DOE/ID-11010
Revision 0
September 2002

U.S. Department of Energy
Idaho Operations Office

Title I (30%) Remedial Design for the Group 7, VES-SFE-20 Hot Waste Tank

INEEL
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Prepared for the
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ABSTRACT

This Title 1 (30%) remedial design was prepared for the Waste Area Group 3, Group 7, VES-SFE-20 Hot Waste Tank, located at the Idaho Nuclear Technology and Engineering Center. The Record of Decision for the VES-SFE-20 Hot Waste Tank states that the tank contents will be solidified for either on-Site or off-Site disposal and this document presents several options for accomplishing that task.

First, various options are presented to solidify the tank contents. Next, the technical description and technical issues associated with each option are discussed. Then, a down-selection process, based on the technical issues, resulted in a recommended option to be considered for final design phases of this project. In addition, techniques that might be used for the removal of the tank, vault, associated system, and under-burden soils are discussed.

This document also presents a comprehensive evaluation of applicable or relevant and appropriate requirements as they apply to the VES-SFE-20 tank remediation. Finally, the document presents a proposed table of contents of the Remedial Design/Remedial Action Work Plan.

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ACRONYMS

ALARA	as low as reasonably achievable
AMWTF	Advanced Mixed Waste Treatment Facility
AOC	area of contamination
ARAR	applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CPP	Chemical Processing Plant
COC	contaminant of concern
CWP	Characterization Work Plan
D&D&D	deactivation, decontamination, and decommissioning
FECF	Fuel Element Cutting Facility
HEPA	high-efficiency particulate air
HIC	high-integrity container
HWMA	Hazardous Waste Management Act
ICDF	INEEL CERCLA Disposal Facility
INEEL	Idaho National Engineering and Environmental Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
LDR	land disposal restriction
LED	light-emitting diode
LLW	low-level waste
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NTS	Nevada Test Site
OU	operable unit
PCB	polychlorinated byphenyl
PEW	process equipment waste
PPE	personal protective equipment

RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RD/RA	remedial design/remedial action
ROD	Record of Decision
RWMC	Radioactive Waste Management Complex
SFE	Storage Facility Exterior
SWEIS	solid waste environmental impact statement
TBC	to be considered
TBD	to be determined
TRU	transuranic
VES	vessel
WAC	Waste Acceptance Criteria
WAG	waste area group
WIPP	Waste Isolation Pilot Plant
WP	Work Plan

Title I (30%) Remedial Design for the Group 7, VES-SFE-20 Hot Waste Tank

1. INTRODUCTION

Waste Area Group (WAG) 3 is a collection of contamination sites at the Idaho Nuclear Technology and Engineering Center (INTEC) at the Idaho National Engineering and Environmental Laboratory (INEEL). Over years of operation, inadvertent releases of radioactive and possibly hazardous materials to the environment occurred that later were grouped together and collectively identified as WAG 3. Because of significant differences between the various release sites at INTEC, WAG 3 was divided into 14 operable units (OUs). OU 3-13 is divided into seven groups. Group 7 (also known as release site Chemical Processing Plant [CPP]-69) consists of a concrete vault containing an abandoned radioactive liquid waste tank, an access tunnel, a pump pit, CPP-642 pumphouse, and contaminated soils associated with releases from the tank. Prior to a camera entry on June 19, 2002, the tank was believed to contain about 400 gal of radioactive liquid and 55 gal of radioactive sludge. The video from the June camera entry showed that the tank may contain less sludge than previously calculated and that there is no standing liquid on the sludge (for more details, see Section 1.4).

The OU-3-13 remedial investigation and feasibility study process evaluated the nature and extent of soil and groundwater contamination at the INTEC, this included the investigation and remediation approach for Group 7. As documented in the OU 3-13 Record of Decision (ROD) (DOE-ID 1999), the selected remedial approach for Group 7 is to remove the tank and its contents; the vault; the remainder of the SFE-20 structures, piping, and other components; and any potentially contaminated soils and transport them for either on-Site or off-Site disposal. Solidification was selected as the treatment method for the sludge in the tank. Solidification techniques have been successful in treating similar wastes because of their wide range of applicability and the low costs of the reagents (EPA 1988). The purpose of this document is to

- Present several available options for solidifying the sludge and removing the Vessel (VES)-Storage Facility Exterior (SFE)-20 tank
- Select an option for stabilization and removal of the tank and contents
- Describe a phased approach for removal of the tank, the vault, associated system, and the underburden soils
- Present the draft Table of Contents for the Remedial Design/Remedial Action Work Plan for Waste Area Group 3, Operable Unit 3-13.

1.1 Background

The INTEC is a facility located within the INEEL in southeastern Idaho near Idaho Falls (see Figure 1-1). Operations at INTEC (formerly the CPP, see Figure 1-2) began in 1952 and continue to the present. The VES-SFE-20 tank was constructed in 1957 to collect radiologically contaminated liquids from floor drains in Building CPP-603. Figure 1-3 shows an isometric view of the tank and its vault.

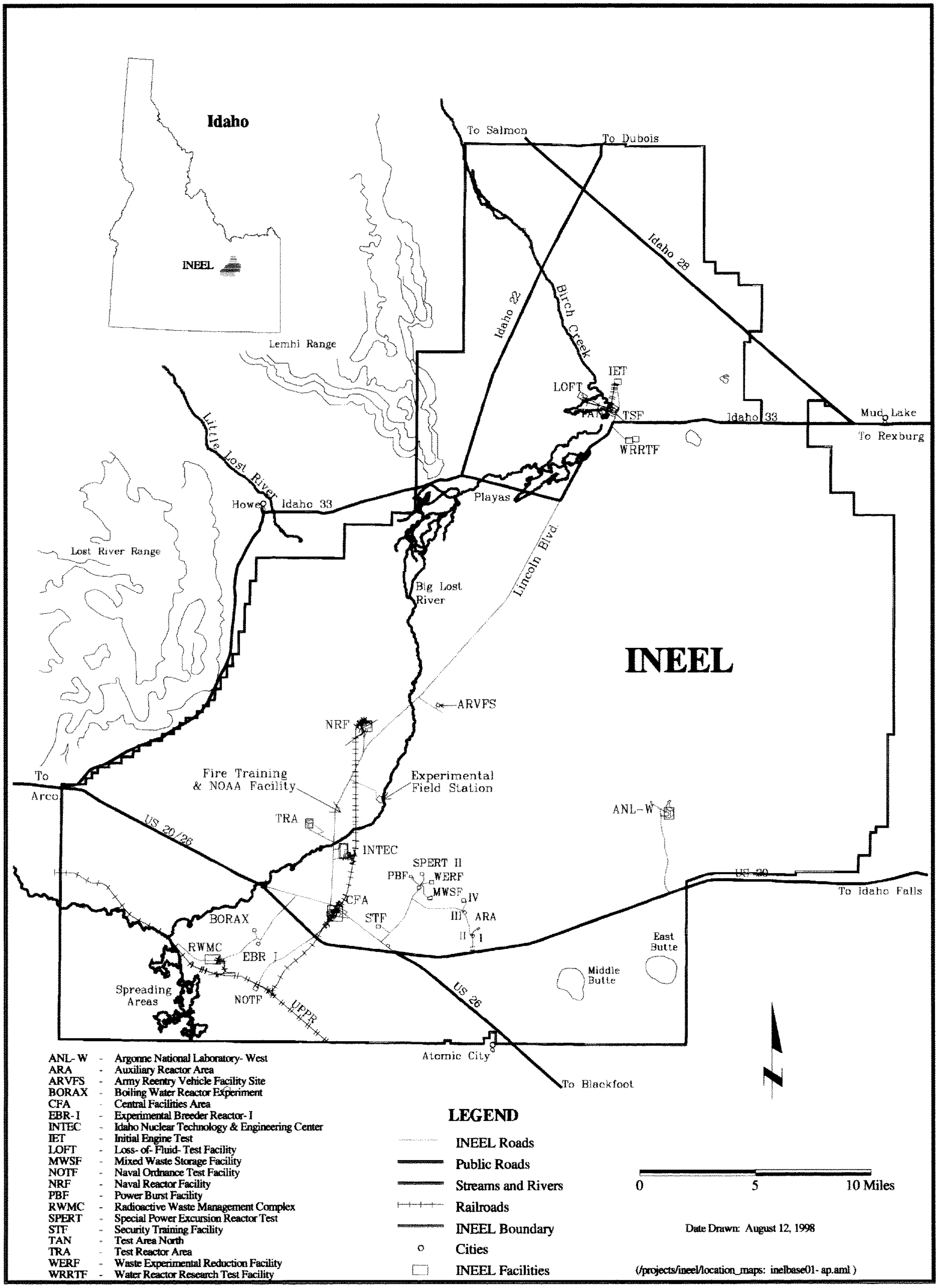


Figure 1-1. Map of the Idaho National Engineering and Environmental Laboratory.

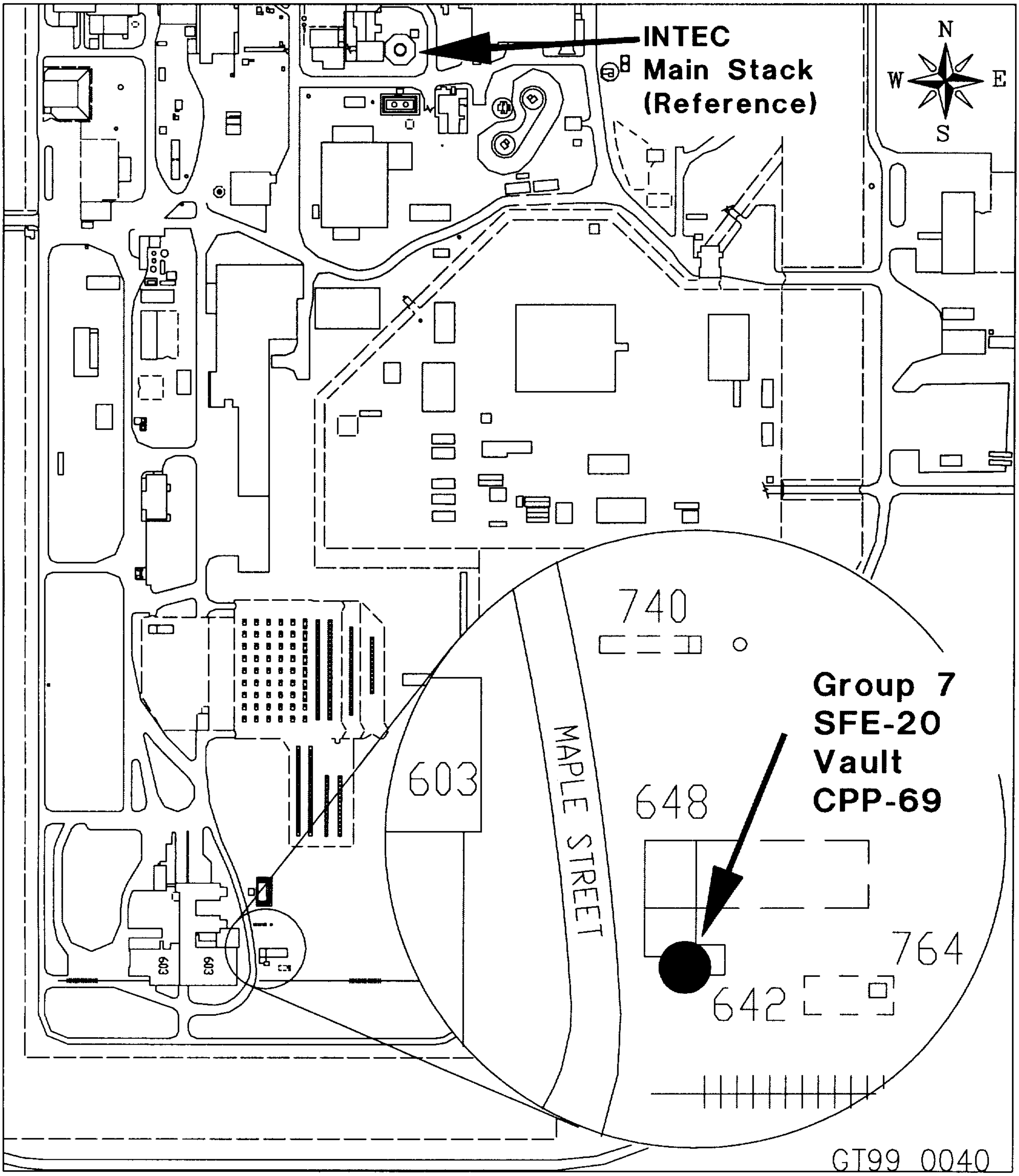
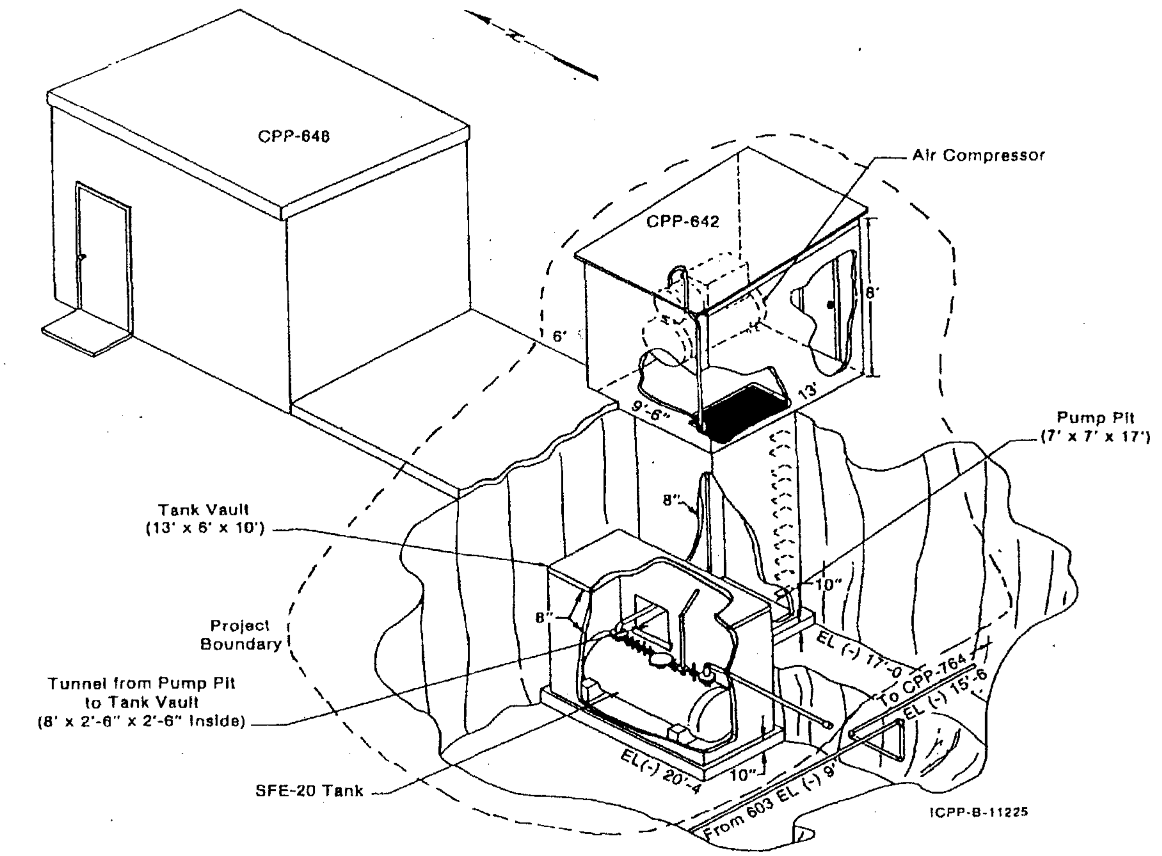


Figure 1-2. Location of the VES-SFE-20 tank in WAG 3.



Isometric view of tank vault and pump pit.

Figure 1-3. Isometric view of the tank vault and pump pit.

The Fuel Element Cutting Facility (FECF) in the Building CPP-603 south basin area sent radioactive liquid waste to the VES-SFE-20 tank. This facility was used to cut aluminum-clad fuel originating from a test reactor at the Savannah River Site. The FECF conducted fuel-cutting operations beginning in 1959 and ending in 1962. Floor drains in the fuel receiving area, the decontamination pad, and in the FECF collected decontamination solutions, which included liquids from the shipping casks and other hot waste liquids. Liquid waste flowed, by gravity, from the floor drains to the VES-SFE-20 tank and was then pumped, for dispositioning, to the Process Equipment Waste (PEW) Evaporator Facility. At the conclusion of fuel-cutting activities, acid was flushed down the drains to the tank, and the tank was heated to dissolve fine cuttings in the tank and lines that had passed through the strainers in the floor drains. This solution was then pumped to the PEW Evaporation Facility for treatment. In addition, the tank received backwash water from the filter system that removed contaminants from the basin water. These contaminants included radionuclides from leaking fuel containers. The VES-SFE-20 tank was taken out of service in 1976 and has not been used since. The pump was removed and piping connections were capped.

In 1984, the contents of the tank and the pump pit were sampled (WINCO 1984). Smears were also taken of the tank vault and the access ways. Elevated activities of radioisotopes of cesium, cobalt, strontium, europium, plutonium, and uranium were detected. Additional information on the tank is discussed in Section 1.3.

1.2 VES-SFE-20 Tank System Description

The SFE-20 Hot Waste Tank System is also known as Site CPP-69, which consists of a concrete vault containing an abandoned radioactive liquid waste storage tank. The top of the tank vault is located about 3 m (10 ft) below grade. The tank system consists of the tank contents, tank, and associated structures located east of Building CPP-603 (Figure 1-2). The VES-SFE-20 system includes the VES-SFE-20 tank, tank vault, access tunnel, associated pump pit, and CPP-642 building with related piping and instrumentation (Figure 1-3). The tank and contents, along with the tank vault, pump pit, and associated piping are identified as CERCLA Site CPP-69. Based on historical information, the lines that fed the VES-SFE-20 tank and transferred the waste to the PEW were isolated from this tank and incorporated into other tank systems when the use of the VES-SFE-20 tank was discontinued in 1976. What remains of the tank system will be removed as part of the remedial action described in the OU 3-13 ROD. A more detailed description of the system boundaries is given in Section 3.1.

1.3 Past Characterization

In 1984, the contents of the VES-SFE-20 tank—approximately 208 L (55 gal) of sediment and approximately 1,514 L (400 gal) of liquid—were sampled for radiological content only (WINCO 1984). During the 1984 tank characterization, sludge samples from the bottom of the tank were evaluated for Pu-238 and Pu-239 and a combined concentration of 93.5 nCi of Pu-238/239 per gram of sludge was determined. Because of the decay of Pu to other transuranic materials and the presence of other materials that are always present in spent fuel material (most notably Np and Am), a revised estimate of the total transuranic curie content in the sludge was made (see Appendix A). This estimate was made based on knowledge that the source for the radiological material was cuttings from Savannah River Plant spent fuel assemblies and the age of the material was approximately 25 years. Based on this information, the revised estimate for the sludge material is 117 nCi/g. The sampling description follows:

- On January 17, 1984, preliminary radiological measurements were performed in the CPP-642 pump pit and VES-SFE-20. The radiological levels, as measured by portable radiological instrumentation (Eberline RO2A), are shown in Figure 1-4. All readings were taken approximately 2.5 cm (1 in.) from the surface. A few days later, another entry was made to obtain further information, including Polaroid pictures.

- In February 1984, documentary photos were obtained and several samples for radiological analysis were collected from the pump pit, access tunnel, tank, and vault. The INTEC Radiochemical Analysis Laboratory performed the sample analyses on the samples. Initial analysis was by gamma scan for all gamma-emitting nuclides. The strontium, plutonium, and uranium analyses were obtained by wet chemical separation (see Figure 1-5).

- The interior and exterior of CPP-642 are radiologically clean. The ladder and interior of the pump pit below floor level are separated from the rest of CPP-642 by a removable grating. The VES-SFE-20 vent line and sample lines may have some interior contamination. The lines were either intact or capped at the time of sampling; therefore, no interior sampling was done on the lines inside of CPP-642.

No subsurface core samples were taken of the soils above the VES-SFE-20 tank due to the buried lines and conduits in the area. However, in 1976, an excavation was performed to cut and cap the inlet pipe to VES-SFE-20 (2 m [7 ft] south of the tank vault) and route the line to the new VES-SFE-126 tank. A common INTEC practice was to backfill, to within 0.9 to 1.2 m (3 to 4 ft) of the surface, with the slightly contaminated soils encountered during excavation. Therefore, there is a possibility that the subsurface soil near the south end of the VES-SFE-20 tank vault is contaminated.

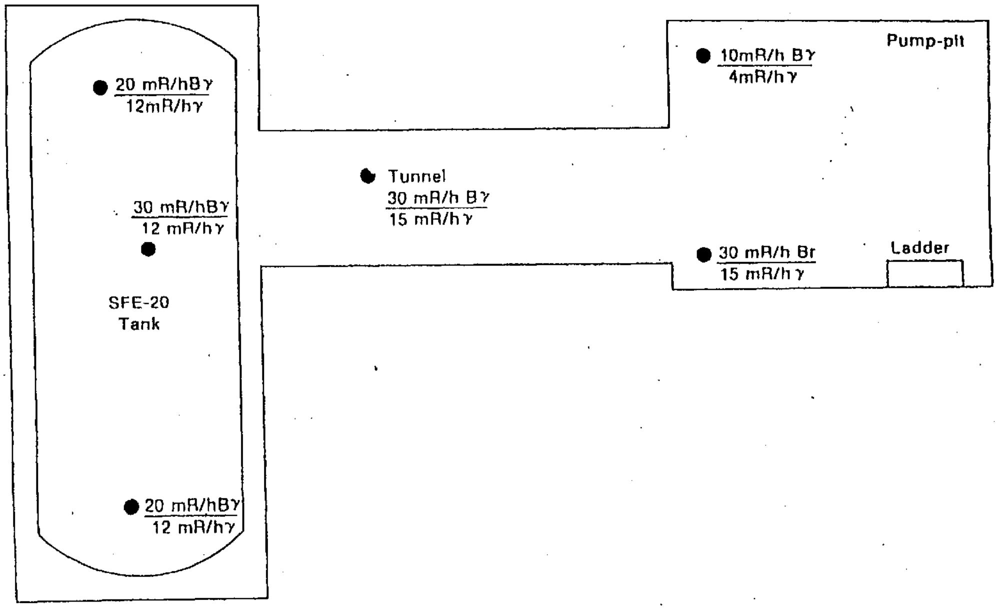


Figure 1-4. Radiological readings from 1984 in the tank vault and access ways.

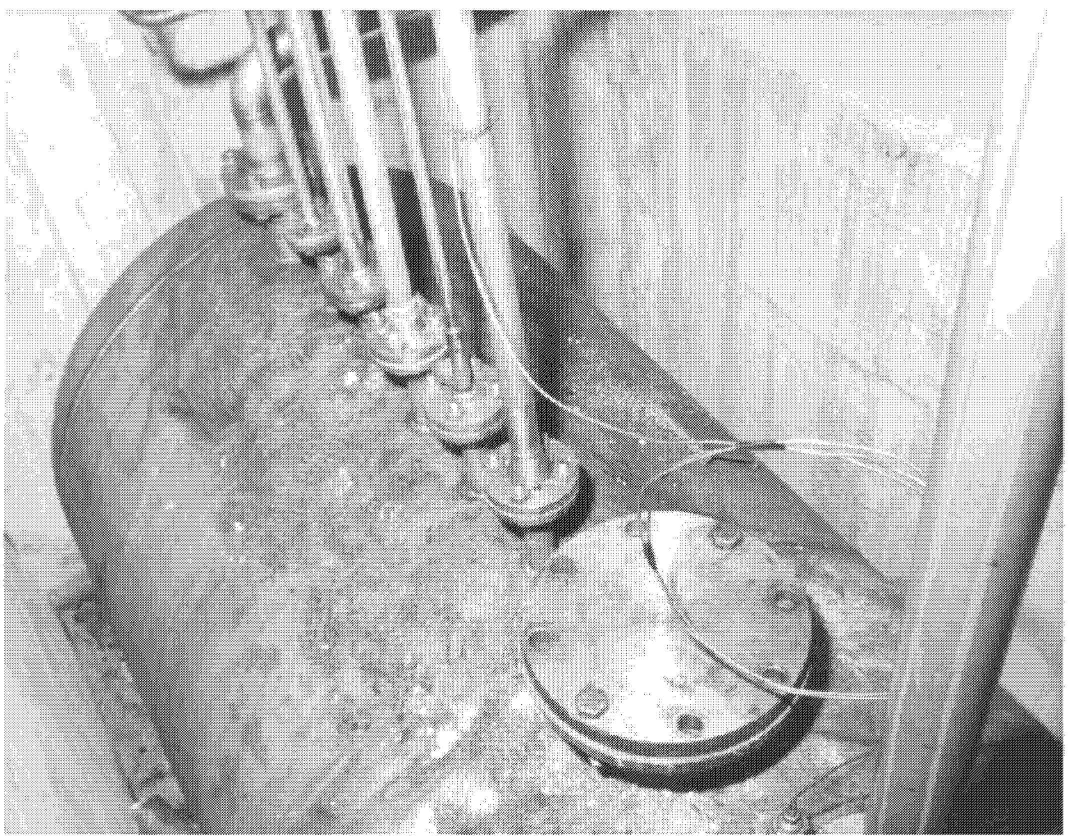


Figure 1-5. Photograph of tank and interior of vault taken during 1984 entry.

A more recent entry into the VES-SFE-20 tank vault was performed in 1991 to evaluate conditions in preparation for decontamination and dismantlement work; however, no further action has been taken to date. The 1991 entry was videotaped and provides the most current information on conditions in the vault.

In June 2000, dose rate calculations based on the 1984 sampling data were completed. The analysis is included in Appendix A of the *Characterization Work Plan for the VES-SFE-20 Waste Tank at INTEC* (DOE-ID 2000a). In summary, it was calculated that an amount of sludge equal to 44 gal would be 5.3 R/h at contact whereas a similar amount of liquid would be tenths of mR/h at contact.

1.4 VES-SFE-20 Hot Waste Tank Remote Camera Inspection

To provide substantive information for remedial design of the VES-SFE-20 tank and contents, an attempt was made to quantify the volume of liquid and solid waste remaining within the tank. In February 1984, entry was made into the tank vault for radiological sampling and characterization purposes. From this task, approximately 400 gal of liquid waste and approximately 55 gal of sludge were estimated to remain in the tank. Because the volume of liquid waste could have changed since 1984 due to evaporation, condensation, or other unknown factors, a current volumetric inventory of liquid waste was needed. Due to the complexity of rescue issues, work controls, and associated costs of a manned entry into the vault, remote camera entry into the tank was initiated to accomplish this task.

A review of possible remote access points (i.e., piping) to the VES-SFE-20 tank determined that the 2-in. vent line provided the best alternative. The decision was based on accessibility to the line, the length from the entry point to the tank, and the number of angles in the pipe prior to entry into the tank. The vent line surfaces on the exterior of the west side of CPP-642. The line is plumbed to a check valve within a foot above the ground surface, and just prior to entering CPP-642 where it passes through a high-efficiency particulate air (HEPA) filter. The check valve junction was the entry point for the camera inspection.

A shelter tent and radiological glovebag were constructed over the vent line check valve. On May 22, 2002, the check valve was removed and remote camera personnel inserted a small ¼-in. Toshiba video camera into the vent line. The camera was equipped with a ring of light-emitting diodes (LEDs) and was fitted with water-resistant material for submersion into the tank liquid and sludge. Remote camera personnel also equipped the camera with several other items including sleeving to cover the camera and LED wiring, and a small tube to insert stiffening wire to aid insertion through the line.

Upon camera entry into the vent line, unexpected liquid was encountered after the first 90-degree turn (see Figure 1-6). An obstruction was encountered just after the first 90-degree turn and was then pushed in front of the camera until another obstruction was encountered. Several efforts were made to get past the obstructions with no success. Shortly after unsuccessful passage of the obstructions, the LEDs stopped working and the camera inspection ceased. At the time, the obstructions were thought to be a blind flange and it was assumed that the camera was submerged in water for longer than anticipated, shorting the lights out. Upon review of the video footage on a large TV, it was determined that the water was a low point where water condensate accumulated by dripping down the vent line from the surface, and the level within the vent line was less than half the diameter of the pipe. The obstructions were identified as a bolt and a white screw cap near the second 90-degree turn (see Figure 1-7). Unknown at the time, the camera was able to pass the bolt and screw cap for a short time and provide a blurry image of the last section of pipe prior to the entry point of the VES-SFE-20 tank. The camera and cord were then removed from the tank and vent line. Litmus paper was used in an attempt to determine the pH of any residual liquid on the camera. Although little residual liquid was present on the camera, litmus paper results were obtained and showed an approximate pH of 4-5. The camera was scanned by a radiological control technician and no significant contamination was present. Then, within a glove bag, the camera was wiped down along with the associated cord, scanned, and managed for future use.

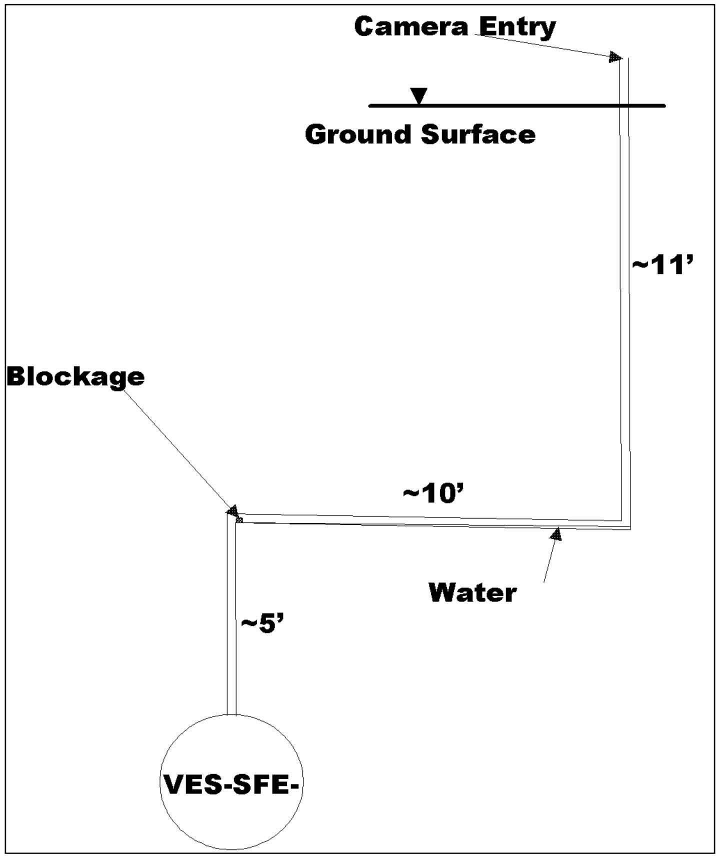


Figure 1-6. Schematic view of VES-SFE-20 vent line and information obtained from initial camera inspection. Dimensions in this figure are estimated based on VES-SFE-20 system drawings.

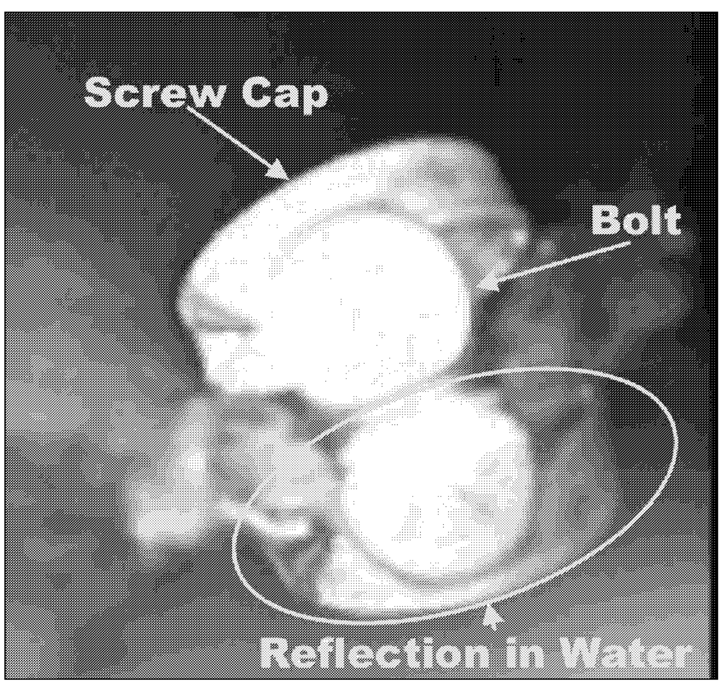


Figure 1-7. Still image of obstruction inVES-SFE-20 vent line.

Because the camera was bound by the blockage and the lights went out, the initial conclusion was that the vent line had been capped. Further inspection of the video footage provided information that the tank still may be accessible through the vent line if the blockage is cleared. Based on the results of this attempted camera inspection, a second attempt in which the blockage would be cleared for camera entry into the VES-SFE-20 tank was conducted.

The second attempt to access the SFE-20 tank was conducted on June 19, 2002. The inspection was conducted in accordance with written technical procedures.

In order to conduct this video inspection, it was first necessary to clear the blockage within the vent line (see Figure 1-6). The blockage was dislodged using a tool developed by INEEL remote camera personnel, which consisted of ¼ in. fish tape with a spring attached to the end of it for mobility. The tool was measured and marked every foot in order to determine how far into the vent line it was inserted. The blockage was successfully removed and the tool was pushed into the SFE-20 tank. The tool was then removed and managed by the project WGS representative. The camera used in the previous inspection attempt was determined to be inoperable, therefore a new camera assembly was inserted into the vent line. The camera was able to reach and enter the VES-SFE-20 hot waste tank. Upon camera entry into the tank, it was noted that there was no visible free liquid remaining in the tank. Although no standing liquid was observed in the tank, some clear fluid (assumed to be condensate) was dripping into the tank from the vent line. The fluid was observed to rest on top of, but not readily mix with, the crusted sludge on the tank bottom. The camera was lowered to touch the top of the sludge, and based on marked measurements on the camera cord and the diameter of the tank, the sludge was determined to be 3-4 in. in depth (~20-30 gal). Upon removing the camera from the vent line, residual sludge on the camera provided a color and physical consistency similar to that of wet clay soil native to the INEEL. An image of the sludge within the tank is shown in Figure 1-8.

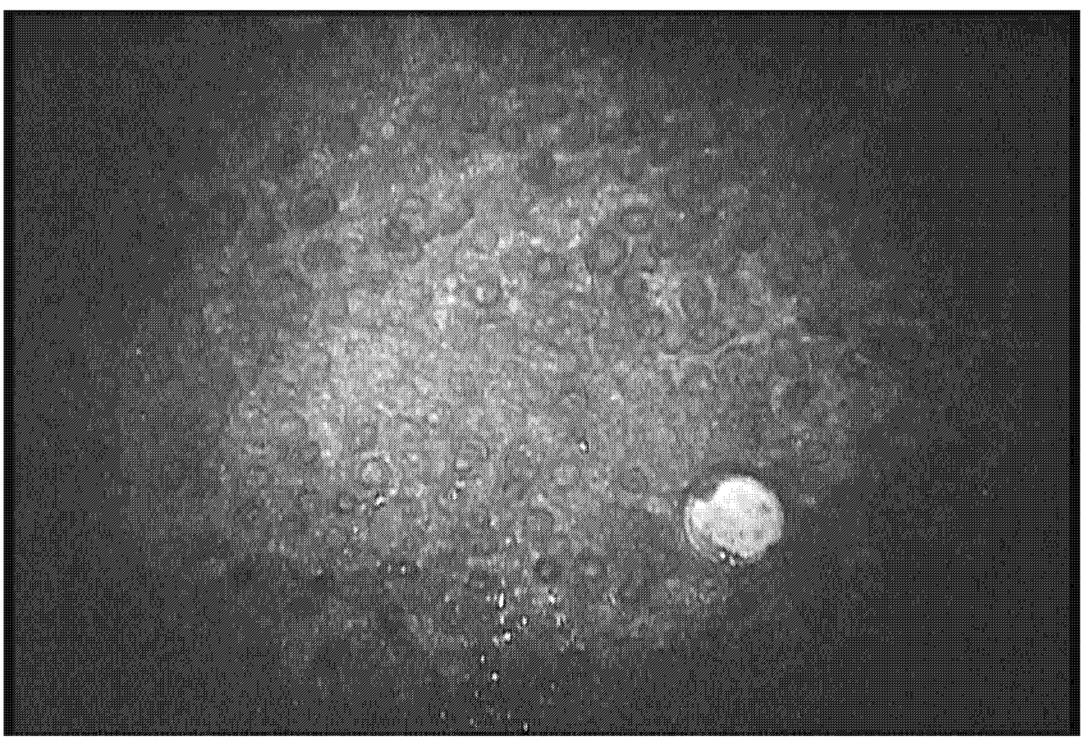


Figure 1-8. Image of sludge at the bottom of VES-SFE-20.

2. REMEDIAL DESIGN CRITERIA

This section provides the alternative description and the risk based remediation goals from the ROD. The alternative description from the ROD is the primary source of criteria to be used for remediation of the VES-SFE-20 tank. This section also contains the general assumptions used in this Title I (30%) Remedial Design for the VES-SFE-20 Hot Waste Tank.

2.1 Record of Decision Alternative Description

A description of the selected alternative for the VES-SFE-20 tank is found in two places in the *Final Record of Decision, Idaho Nuclear Technology and Engineering Center, Operable Unit 3-13* (DOE-ID 1999). The first description on Page x is the declaration of the selected remedy. The second description of the selected remedy is found in Section 11.1.7. A comprehensive discussion of the ROD requirements is provided in Section 6 (ARAR Evaluation) of this document. Both descriptions of the preferred alternative from the ROD are shown below.

2.1.1 Declaration from the ROD, Page x

The following text is verbatim from the ROD (DOE-ID 1999):

> The major threat posed by the SFE-20 Hot Waste Tank System is leaching and transport of contaminants to the SRPA and subsequent exposure of future groundwater users to radionuclides via ingestion. The selected alternative for the SFE-20 Hot Waste Tank System is Removal, Treatment, and Disposal. This alternative includes:
>
> - Remove and treat on-site the liquid and sludge contents of the tank.
> - Excavate and remove the tank, vault, and associated structures.
> - Land dispose treated waste, the tank, vault, and other debris. The preferred disposal site is the ICDF; however, if any residue or material fails to meet the ICDF WAC, an alternate suitable disposal facility will be identified during the remedial design.
> - Remove and treat off-site, if wastes found in the tank are alpha-LLW (i.e., exceed 10 nCi/g transuranic [TRU] constituents [alpha emitters with an atomic number greater than 92 and a half-life exceeding 20 years]) or TRU wastes (i.e., greater than 100 nCi/g TRU).

2.1.2 Description from the ROD, Section 11.1.7

The following text is verbatim from the ROD (DOE-ID 1999):

> The selected remedy for the SFE-20 Hot Waste Tank System is Alternative 4—Removal, Treatment, and Disposal. Alternative 4 consists of:
>
> - Institutional controls (i.e., warning signs) until the removal of the tank liquid and sludge
> - Sampling the tank contents

- Removal and ex situ treatment of the tank liquid and sludge
- Excavation and removal of the tank, tank vault, pump pit enclosures and other associated structures
- On-site disposal of the tank and associated structures.

Following characterization, the tank liquid will be removed and treated at the PEW evaporator if it meets the specified waste criteria. The tank sludge will be removed and treated (ex situ) using a suitable grout to solidify and stabilize the contaminants in the sludge. The stabilized sludge will then be drummed and disposed either on-Site or off-site at a suitable engineered disposal facility. Depending on waste characteristics, the remaining components of the tank system will be excavated, removed, and disposed in the ICDF or off-site, depending on whether they meet the ICDF waste acceptance criteria. The excavation will be backfilled to grade with clean soils.

It is assumed that the liquid within the SFE-20 tank will meet the PEW WAC. The liquid contents of the tank are consistent with previous INTEC waste processed through the tank system and discharged to the PEW. However, if the PEW is unable to accept the liquid waste or is unavailable at the time the response action is conducted, a small portable evaporator unit would be utilized on-Site; or the waste would be disposed off-site in accordance with the Off Site Rule (40 CFR 300.440).

Alternative 4 is selected because it best meets the five balancing criteria while providing overall protection of human health and the environment and compliance with ARARs. The Agencies believe the selected alternative is protective of human health and the environment, complies with ARARs, uses a permanent solution, and is cost effective.

2.2 Soil Risk-Based Remediation Goals

This section contains the remediation goals as defined Section 8 of DOE-ID (1999). Table 8-1 from the ROD provides the minimum levels for each of the contaminants of concern (COCs), which is included because it provides the cleanup requirements for this remediation. The table and the associated text are verbatim from the ROD:

2.2.1 Description from the ROD Section 8.1.7

The following text is verbatim from DOE-ID (1999):

8.1.7 VES-SFE-20 Hot Waste Tank System (Group 7)

The principal threats posed by the VES-SFE-20 Tank system is external exposure and the potential for a contaminant release to the environment. The remediation goals for the SFE-20 tank system are as follows:

1. Limit potential external exposures to workers and non-workers

2. Remove radioactive and hazardous substances remaining in the tank system to prevent potential contaminant releases to the underlying soils or groundwater.

The remediation goals will be accomplished by:

1. Maintaining existing institutional controls to prevent current worker and non-worker exposure.

2. Removing, excavating, treating, and disposing the SFE-20 hot waste tank system waste and components to eliminate the threat of release to the environment (waste that meets the ICDF [INEEL CERCLA Disposal Facility] WAC [Waste Acceptance Criteria] will be disposed in the ICDF).

3. Remediating contaminated soils present beneath the SFE-20 tank system that may pose an external exposure risk or threat to groundwater (waste that meets the ICDF WAC will be disposed in the ICDF).

Table 8-1. Soil risk-based remediation goals.

Contaminant of Concern	Soil Risk-Based Remediation Goal[a] for Single COCs[b] (pCi/g or mg/kg)
Radionuclides	
Am-241	290
Cs-137	23
Eu-152	270
Eu-154	5200
Pu-238	670
Pu-239/240	250
Pu-241	56,000
Sr-90	223
Nonradionuclides[c]	
Mercury (human health)	23

a. Source of risk-based soil remediation goals: Table 2-1 of the OU 3-13 FS. Risk-based remediation goals developed for residential scenario.

b. If multiple contaminants are present, use a *sum of the fractions* to determine the combined COC remediation goal.

c. The mercury remediation goal was selected from the EPA Region 3, April 1996, screening guidance for soil ingestion under the residential scenario.

2.3 General Assumptions

The following assumptions were made in preparing this document:

1. The tank contains no more than 55 gal of sludge material.
2. The tank is free resting in tank stands; however, some unknown tie-down of the tank may exist that will require either remote removal or manned operation.
3. The waste has a total polychlorinated byphenyl (PCB) concentration which will meet the Waste Acceptance Criteria (WAC) of the selected disposal facilities, and a total PCB concentration less than 10 ppm, such that no PCB storage requirements will apply to the removed wastes.
4. The waste from the tank potentially contains characteristic (corrosive) waste. The grout that is added to the matrix will overcome the characteristic nature of the waste.
5. There will be no criticality concerns associated with the tank contents.
6. A comprehensive sampling and analysis will be conducted that will provide current characterization data.
7. The vault roof can be removed and access to the 2-in. vent line and the 6-in. blind flange can be obtained for remote camera operations and grout introduction to the tank.
8. An acceptable grout can be found to handle salts, organics, and other possible interferences in the waste matrix.
9. Confined space and other health and safety issues can be addressed to allow access to the tank.
10. Integrity of the tank is such that lifting operations can be accomplished safely without additional reinforcement.
11. The tank is determined to contain TRU concentrations >10 nCi/g in prior sampling.

3. DISCUSSION OF RESPONSE ACTION OPTIONS

The remedial design for the VES-SFE-20 Hot Waste Tank will reflect the ROD requirement that the tank system, including contaminated surrounding soils, be removed, treated, and disposed of in an approved disposal facility. The tank sludge contents will be solidified prior to disposal. Removal of the tank, vault, and other debris will be conducted in two phases. Phase I will consist of removing the tank and its contents, and removing the piping that may block removal of the tank and removing loose surface contamination and liquids from the vault floor. All contamination that is not removed during Phase I will be documented and subsequently removed during Phase II. Measures will be implemented to ensure that contamination does not migrate to other media during the interim period. Phase II will consist of removing the remaining piping, components, structures, and contaminated soil to be disposed of in the INEEL CERCLA Disposal Facility (ICDF). Phase II will be performed later in conjunction with the closure or deactivation, decontamination, and decommissioning (D&D&D) of VES-SFE-106/CPP-648.

As stated in the OU 3-13 ROD, the tank contents will require sampling to fully characterize the waste. The Characterization Work Plan (CWP) (DOE-ID 2000a) for sampling and analysis of the tank contents is in the process of being implemented. Although the CWP is primarily written to describe sampling of the tank liquids, it also discusses opportunistic sampling of the sludge. The sludge sampling will be performed, if possible, as described in the CWP. All sampling will be performed in accordance with the appropriate regulations and agreements. The sampling activities will provide current characterization data. However, access to the tank is constrained by many factors. If implementing the CWP is unsuccessful, samples will be obtained during the remedial action once access to the tank is achieved.

This section discusses the system boundaries and tank content removal approaches. This section also provides the disposal options and a discussion of the ROD compliance for the recommended options.

3.1 System Boundaries

The boundaries of the VES-SFE-20 system include the VES-SFE-20 tank, tank vault, access tunnel, associated pump pit, and CPP-642 building with related piping and instrumentation (Figure 1-3). The potential extent of soil contamination will not be known until remedial actions are in progress. Based on historical information, the lines that fed the VES-SFE-20 tank and transferred the waste to the PEW Evaporation Facility were isolated from this tank and incorporated into other tank systems when the use of the VES-SFE-20 tank was discontinued in 1976. What remains of the tank system will be removed as part of the remedial action and is shown on the Demolition Plan Drawings D-1 through D-3 (Appendix B).

The following is the VES-SFE-20 system components that will be excavated and removed under this remedial action:

- <u>VES-SFE-20 Tank, Tank Vault, and Tank Contents</u>—This includes the actual tank and all materials in the tank. It also includes the following tank vault and associated components:
    - All pipe, valves, and ancillary plumbing in the vault
    - Any residual debris or equipment in the vault
    - Sediments in the vault
    - Insulating materials.

- VES-SFE-20 Tank Accessway Tunnel—This includes the concrete accessway, piping, insulation, and debris.

- VES-SFE-20 Pump Pit—This includes the structure and contents, such as any sediments in the pump pit, piping, valves, and insulation.

- Surrounding Soils—Should soil be encountered that exhibits contaminant levels above the remedial action objectives (RAOs) in the ROD (DOE-ID 1999), the soils would be removed, treated if necessary, and disposed of in the ICDF. If contaminated soils are associated with another CERCLA/RCRA site in the area, the soils will be addressed by a subsequent remedial action.

- Building CPP-642 and Contents—Building CPP-642, including interior equipment, will be demolished and removed. Some equipment and piping inside the building was exposed to process waste and will be disposed of in the ICDF.

VES-SFE-20 tank system piping is described below. It should be noted that only pipelines associated with the tank and waste processing are described herein. Additional pipelines and equipment not associated with waste processing may require removal to accommodate tank remediation and are not described. The piping and instrumentation diagram Drawings D-2 and D-3 shown in Appendix B identifies all the pipelines that will be removed under this remedial action.

- Two-In. Vent Line—This line contains a high-efficiency particulate air (HEPA) filter. It is still in place and will be removed as part of the VES-SFE-20 Tank System.

- Two-In. Acid Fill Line—This line was used for adding nitric acid to the tank, is still connected to the tank, and leads to the surface. This line will be completely removed as part of the remedial action.

- One-In. Sparge Line—This line was used for air sparging to mix the tank contents. It is capped off and will be remediated with the tank.

- One-In. Steam Line—This item consists of two lines, one that fed steam to the tank and one that returned condensate from the tank for heating. The line enters the tank on one end, coils through the bottom of the tank for heating of the contents of the tank, and exits the tank on the other end. These lines have been capped. Any residual portions of this line will be removed as part of the remedial action.

- Half-In. Suction and One-In. Drain Lines—These lines were used for sampling the tank and will be removed during the remedial action.

- Four-In. Drain (Influent) Line (PLA-100116)—This is the influent line from the CPP-603 floor drains. It has been cut and capped approximately 9 ft south of the VES-SFE-20 tank vault (Drawing U-1, Appendix B) and is isolated from the floor drain system and other tanks. This residual section of line will be removed as part of the remediation of the VES-SFE-20 tank. The remainder of the drain from the CPP-603 floor drains is plumbed into the VES-SFE-126 tank and is no longer part of the VES-SFE-20 Tank System.

- Two-In. Pump Suction (Effluent) Line—This line is 2 in. in diameter from the tank to the pump connection (the pump has been removed from the pump pit). The pump discharge line is 1.5 in. and was used to transfer the liquid waste to the INTEC tank farm. This line (PLA-104804) tied into the discharge line for VES-SFE-106 inside the CPP-648 pipe corridor, but was cut and capped when

VES-SFE-20 was abandoned in the 1970's. Therefore, this line will be removed to where the line is capped off in CPP-648. The rest of this line is used for VES-SFE-106 and is no longer part of this system (Drawings D-2 and D-3, Appendix B).

3.2 Tank Content Removal Options

Initially, three general approaches were evaluated for removal and stabilization of the water and sludge in the VES-SFE-20 tank. These approaches assume the contents of the tank consisted of a sludge phase and a liquid phase. The first approach includes two options (Options 1 and 2) that remove the liquid and solidify the tank sludge contents in place prior to tank removal. The second approach (Options 3 and 4) involves removing the liquid and the sludge as a mixed-slurry for treatment above grade. Finally, a third approach (Options 5 and 6) involves removing the water and sludge separately and solidifying them above grade prior to disposal. These six options that were initially included in the evaluation are shown in the next section with a brief description.

Because new information (see Section 1.4) indicates only a sludge phase, Options 3 and 4 were eliminated from consideration because they both involved using the tank liquid to mix a slurry prior to removal and grouting. Similarly, Option 6 was disregarded due to the appearance of a "crust-like" sludge, which would require reintroducing water to form a slurry prior to pumping. Option 5 was disregarded due to ALARA concerns during tank removal and handling as well as inadequate characterization of the sludge.

Options 1 and 2 provide viable means of stabilizing the sludge. Option 1 (pressure grouting) can be utilized if characterization of the sludge indicates adequate mixing is not achievable with gravity-fed grout; therefore, this option is presented as the preferred design approach. A full technical description utilizing Option 1 is provided. This option is presented as a viable design approach; however, the wastes will be treated and packaged as appropriate following characterization in order to meet the WAC of the intended disposal facility.

3.2.1 Approach 1 – Treat Tank Contents in Place Followed by Removal

This approach discusses two options (Options 1 and 2) associated with removing the liquid followed by introducing grout into the tank, allowing the resulting mixture to cure in situ, and then removing the tank as a solidified waste form.

- Option 1 – Grout Mixed with Sludge In Situ Using Pressure Grouting - This option involves removing the liquid phase followed by grouting the tank sludge in place using pressure grouting techniques to ensure adequate mixing of the sludge/grout matrix. Tank retrieval follows the stabilization process.

- Option 2 – Grout Mixed with Sludge In Situ Using Gravity Feed - This technique is similar to Option 1 because it involves in situ tank grouting, but the method and degree of mixing of the grout and sludge are significantly different because the grout is gravity fed rather than pumped under high pressure. Due to the limited mixing with the gravity-feed option, this method is only acceptable if the resulting waste form is disposed of on-Site.

3.2.2 Approach 2 – Ex Situ Solidification of Slurried Contents

This approach involves mixing the sludge and the water in situ in the tank to form a slurry that is pumped out of the tank to an above-ground location. The options presented in this approach (Options 3 and 4), both use the same agitation technique to mix the sludge/water contents of the tank to a slurry.

Once above ground, Option 3 mixes the slurry with dry grout in a high-integrity container (HIC). Option 4 filters the particulate out of the slurry in a HIC, processing all the water separately, and grouting the particulate filter and HIC as a unit.

- Option 3 – Mix Slurry and Grout the Contents in a HIC - Option 3 involves creating a slurry of the tank contents (liquid and sludge) prior to removing the tank and then solidifying the slurry above ground in a HIC. A mixing apparatus such as the AEA Fluidic Pulsating pump system could be used to agitate the tank contents sufficiently to form a uniformly distributed slurry.

- Option 4 – Filter Slurry and Solidify Filtration with Grout - This option is very similar to Option 3, however, the handling of the slurry is different once above ground. Once the slurry has been removed from the tank and pumped to the surface, the slurry is then pumped under pressure through a filtration or dewatering system contained inside a shielded HIC.

3.2.3 Approach 3 – Remove Water and Sludge Separately

This approach presents two options (Option 5 and 6) that involve moving the water and sludge in the tank to the surface separately. Option 5 involves first removing the water and then removing the tank with the sludge in place (untreated) to the surface for in-tank treatment. Option 6 involves removing the sludge and water by separate processes, treating this material above grade, and then removing the empty tank.

- Option 5 – Remove Tank with Sludge Intact - Option 5 involves pumping the water from the tank and then removing the tank with the sludge intact. Because the sludge is not solidified prior to removal, tank integrity is required in this option to ensure contamination control.

- Option 6 – Remove Water and Sludge by Separate Pumping - Option 6 also removes the water and sludge separately; however, the sludge is removed as liquidous sludge material while the tank remains in the vault. Tank integrity is required because of the need to add additional water to the tank for the slurried mixture.

3.3 Description of Preferred Design Approach

As previously stated, Option 1 provides viable means of stabilizing the sludge. Option 1 is presented as the preferred design approach; however, the wastes will be treated and packaged as appropriate following characterization in order to meet the WAC of the intended disposal facility.

Option 1 (grout mixed with sludge in-situ using pressure-fed grout) involves pressure-feeding low-density grout to the tank. The grout will be introduced into the tank using an articulating grout nozzle to direct grout in multiple directions to facilitate mixing of the grout/sludge. Once the grout has sufficiently cured, the tank will be removed from the vault and placed into a waste box. The following is a detailed description of the entire tank removal process (Phase I removal). Figure 3-1 gives a schematic of the overall sequence.

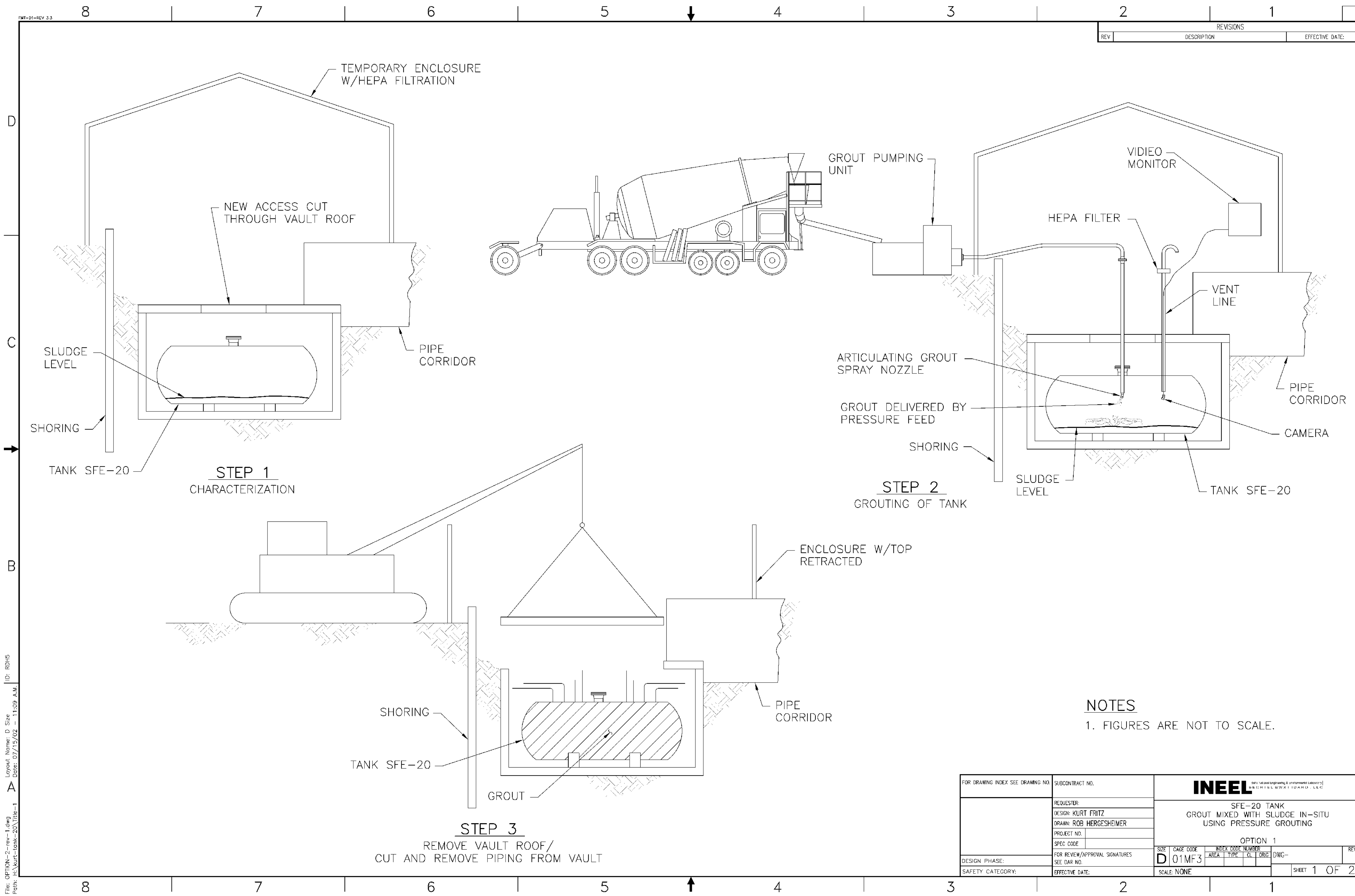


Figure 3-1. Schematic of the overall sequence for Option 2.

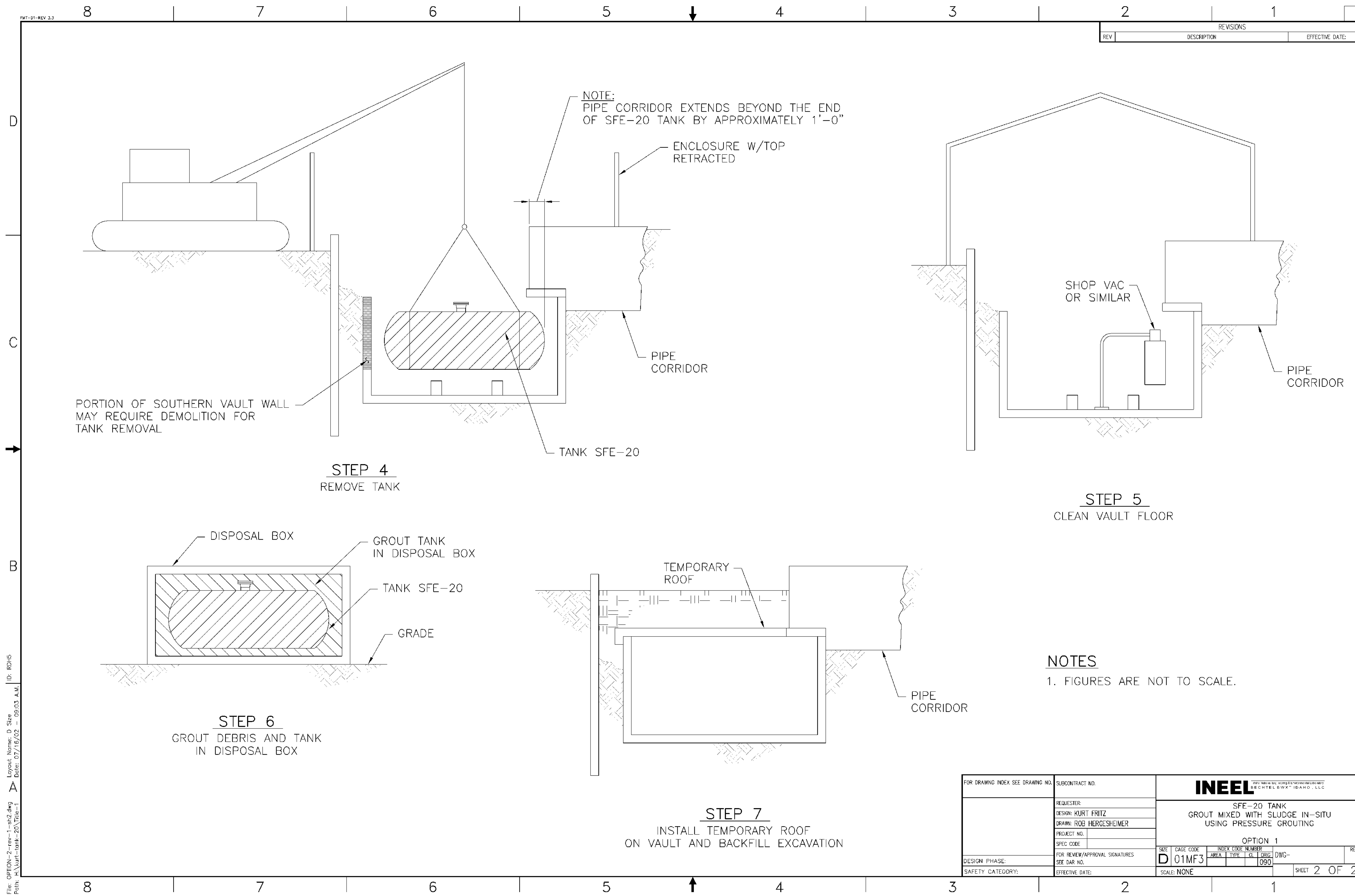


Figure 3-1. (continued).

3.3.1 Characterization

As stated in the OU 3-13 ROD, the tank contents will require sampling to fully characterize the waste. The CWP (DOE-ID 2002a) for sampling and analysis of the tank contents is in the process of being implemented. Sludge sampling will be performed, if possible, as described in the CWP. Sampling will be performed in accordance with the appropriate regulations and agreements. The sampling activities as described therein will provide current characterization data. However, access to the tank is constrained by many factors. If implementing the CWP is unsuccessful, samples will be obtained during the remedial action once access to the tank is achieved. Because the sludge in the tank emits a high radiation field, care has to be taken not to needlessly expose workers to radiation. In addition, the tank vault and pump pit are sources for additional radiation. Furthermore, the vault and associated access ways appear to have insulation that may contain asbestos. Because of the potential for asbestos, negative pressure must be maintained in the work area to prevent the migration of asbestos fiber. Physical access to the tank is also limiting. The tank is located in a vault that is a confined space. Access to the vessel is a small tunnel and little room exists to work in the vault itself (see photographs in Figure 3-2). Because of these constraints, a manned entry will be attempted only as a contingency if sampling through the vent line is not possible.

To reduce some of the confinement problems, coring through the vault roof will provide an access to the tank. This access will be accomplished by excavating the soil covering the vault. Shoring will be required due to the numerous structures in the area. Once the top of the vault has been accessed, a hole large enough to allow personnel entry into the vault will be cut into the roof of the vault. Prior to cutting into the vault, a containment/weather structure will be erected over the excavation or on top of the vault. The enclosure will allow water run-off during the operation and will be equipped with a negative pressure HEPA filtration system. In addition, a glove bag may also be installed over the vault if required. Characterization will involve obtaining samples or smears from any material on the outside of the tank and floor of the vault, and grab samples of sludge material from inside the tank. This material will be evaluated for radioactive isotopes and listed and characteristic waste materials.

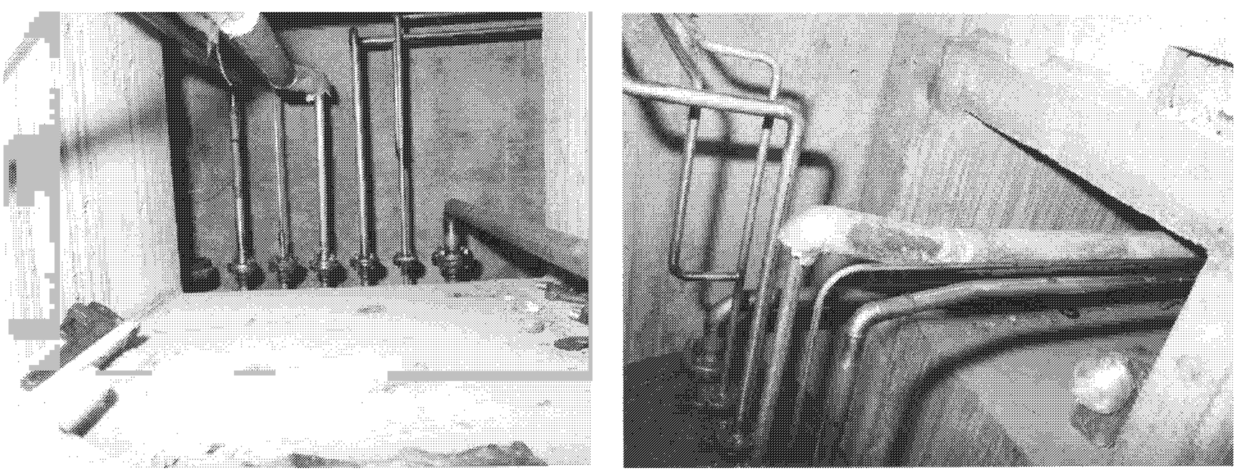


Figure 3-2. Photographs of tunnel leading to the tank taken in 1984 entry.

3.3.2 Grouting the Tank "In Situ"

Prior to filling the tank, the tank integrity will be verified by visual examination. A manifold will be designed and placed on top of the 6-in. access flange to allow addition of the grout into the tank and also allow air to escape. A remote camera system will be inserted into the existing 2-in. vent line to observe filling the tank. The manifold will be placed through the same top access used to obtain samples during the characterization. Once the manifold is in place, an access tube will be inserted through the glove box connecting the top of the tank to a grout delivery truck above ground. Grout will be delivered into the tank using either pressure or gravity feed until full. Filling the tank will require approximately 600+ gal of grout.

3.3.3 Cutting the Flow Lines to the Tank

Once the grout has cured, the lines leading to the tank will be cut where they enter the vault and the flanges removed at the tank. The lines will be further cut in lengths that are compatible with the waste box. Removal of the asbestos insulation throughout the vault will be completed during the general removal operation. Disposal of the asbestos can occur in the waste box. A review of the as-built drawings of the tank system indicated that each line was sloped to allow self-draining into the tank. However, precautions will be made during line removal to contain liquids that may be present. Any spillage of free liquids will be absorbed and included along with other small debris within the vault for inclusion in the waste box. All hazardous materials will be bagged out of the glove box for inclusion in the overpack box above ground.

3.3.4 Tank Removal and Cleaning the Vault Floor

The roof of the vault will require removal to lift the tank out of the vault. Because of the existing pipe corridor above the tank vault, special rigging or additional vault demolition may be required for removal of the tank. Most likely, the roof will be cut into sections for easier handling. The enclosure over the excavation will have a retractable or removable top to allow removal of debris. Because past operations have resulted in overfilling the tank, there is a potential to have loose material on the vault floor and outer surface of the tank. To the extent possible, the tank will be coated with a fixative material to prevent contamination spread during tank removal. A hoisting and rigging plan will be prepared to bring the tank to the surface. The tank is assumed to be free standing on concrete saddles. Fully grouted, the tank will weigh approximately 13,000 lb. Once removed from the ground, the tank will immediately be placed in the waste box.

Following tank removal, the interior portions of the vault will be cleaned of loose surface contamination. This material will be bagged for inclusion in the waste box. The floors and walls of the vault will be sprayed with a coating of strippable paint, polysiloxane, or similar material to prevent the further spread of contamination during dismantlement of the vault.

3.3.5 Preparing the Waste Box for Disposal

The waste box will be large enough to contain the tank and piping removed from within the vault. The container will most likely be made of carbon steel with a polyethylene liner or possibly stainless steel if required. Once the tank and debris have been placed in the box, grout will be poured into the box and allowed to cure. The box will be filled with a grout of lower density than the grout used to gravity feed the tank. It is expected that the grouted waste box will weigh about 58,000 lb.

3.3.6 Placement of a Barrier Over the Excavation

It is anticipated that considerable time will elapse before Phase II of the project will be implemented (see Section 5). To keep water out of the excavation and return the area to a safe condition, a temporary roof made of precast concrete or metal will be placed over the vault and the excavation will be backfilled and compacted.

3.4 Follow-On Work

The option evaluation described above will guide the remedial design/remedial action (RD/RA) process. However, additional studies may also be needed in support of the RD/RA. Once a sample of the sludge can be taken, treatability study requirements will be evaluated during the preparation of the RD/RA Work Plan (WP). Sediments in the tank are difficult to access due to the radiation field in the tank vault and the physical constraints for taking a sample. If a treatability study is necessary, it will be performed prior to remediation of the tank.

4. POTENTIAL FINAL DISPOSAL OPTIONS

This section discusses the potential final disposal options for the sludge and debris (tank, piping, soil, personal protective equipment [PPE], etc.). Option 1, pressure grouting, is the preferred method of treatment/removal of the sludge in the tank. The sludge will be stabilized inside the tank using pressure feed grouting. The final waste form using this technique is expected to be below 10 nCi/gm of transuranic (TRU) isotopes. However, since the "as found" waste may be TRU, disposal in the ICDF may not meet the ROD Declaration and therefore would need to be disposed of at an off-Site disposal facility. As explained in Section 4.3.3, if the final waste form contains TRU isotopes greater than 10 nCi/g but less than 100 nCi/g, both Nevada Test Site (NTS) and Hanford will be evaluated as possible disposal locations. If the final waste form contains TRU isotopes <10 nCi/g, the waste will be disposed of at Envirocare, assuming it meets the Envirocare WAC. Debris from Option 1 will include the tank piping within the vault, PPE, soil, etc. (the tank is part of the sludge final waste form). The debris would be disposed of in the ICDF, if determined to meet the ICDF WAC.

4.1 Listed and Characteristic Waste Issue

Upon evaluation of the process knowledge of the SFE-20 tank, it was determined that there is a potential that the tank contains RCRA-listed waste due to the past usage of solvents and the contents of the tank were not removed when the tank was abandoned in 1976. To date, a hazardous waste determination has not been executed for the tank contents. Upon generation of wastes during implementation of the CERCLA activity, a hazardous waste determination will be performed for each waste stream. The hazardous waste determination will be performed for each waste stream based on sampling results, to identify RCRA characteristic codes, and process knowledge, to identify RCRA listed waste codes. Process information will be assessed to identify any applicable listed waste numbers based on the solvent usage and content, by volume.

4.2 Potential Waste Streams from the VES-SFE-20 Hot Waste Tank

The waste streams that may be generated from remediation of the VES-SFE-20 tank have been determined to be

- Radiation only with <10 nCi/g TRU
- Radiation only with >10 nCi/g but <100 nCi/g TRU
- Radiation only with >100 nCi/g TRU
- Radiation with < 10 nCi/g TRU and characteristic
- Radiation with >10 nCi/g but <100 nCi/g TRU and characteristic
- Radiation with >100 nCi/g TRU and characteristic
- Radiation with <10 nCi/g TRU and listed
- Radiation with >10 nCi/g but <100 nCi/g TRU and listed
- Radiation with >100 nCi/g TRU and listed

- Radiation with <10 nCi/g TRU and PCBs
- Radiation with >10 nCi/g but <100 nCi/g TRU and PCBs
- Radiation with >100 nCi/g TRU and PCBs.

The potential disposal options for the SFE-20 tank are shown in Table 4-1.

The potential for the waste streams to be a combination of one or all of these waste streams (listed at the beginning of Section 4.2) has been reduced or eliminated. Based on the analytical data available, the anticipated final waste form of grout and sludge is expected to be one of the following waste streams or a combination of these:

- Radiation only with <10 nCi/g TRU
- Radiation with < 10 nCi/g TRU and characteristic
- Radiation with <10 nCi/g TRU and listed

4.3 Disposal Options

This section discusses the disposal options based on characterization, historical data, process knowledge, and the disposal facilities' WAC(s). The on-Site disposal option is presented and discussed along with other off-Site disposal options. The recommended option presented in this section for disposal of the waste form is primarily driven by the results from the characterization of the tank contents. A logic diagram is provided that illustrates the decision process and the recommended disposal options based on the characterization data (see Figure 4-1).

4.3.1 On-Site Disposal

For the purposes of this document, on-Site disposal is defined as disposal on the INEEL. The two on-Site options for disposal at the INEEL are the ICDF and the RWMC. With Option #1 as the preferred treatment option, the final waste form will most likely contain TRU isotopes in concentrations <10 nCi/g and a hazardous component. The RWMC can only accept radioactive waste (containing <10 nCi/g of TRU isotopes). Since it is likely that the SFE-20 waste form will contain hazardous, as well as radioactive, waste, the RWMC WAC will not allow acceptance of the waste.

As shown in Table 4-1, the lowest-cost option for disposal of the SFE-20 waste containing <10 nCi/g TRU isotopes and a hazardous component is the ICDF. However, it is anticipated that the "as found" concentration of TRU isotopes within the sludge will show that the waste is TRU; therefore, the sludge must be disposed of off-Site. Characterization of the waste will update the TRU content and determine the type of hazardous components found in the waste.

4.3.2 Waste Isolation Pilot Plant

The Waste Isolation Pilot Plant (WIPP) is a disposal option to be considered only if the SFE-20 waste form is >100 nCi/g TRU. Process knowledge and historical data indicate that the final grouted SFE-20 waste form will not exceed the 100 nCi/g TRU level that would require disposal at WIPP. As shown on the decision process (Figure 4-1), if the characterization data indicate that the concentrations are >100 nCi/g TRU, then WIPP will be considered for disposal. Several issues would need to be resolved prior to sending waste to WIPP. Because WIPP will only accept waste that is containerized in standard

Table 4-1. Waste disposal options.

Waste Stream	Disposal Options	Estimated Costs	Comments
1. Radiation only with <10 nCi/g TRU	Envirocare	\$20K minimum charge \$34/ft^3 direct disposal	Transportation cost is approximately \$1,300/truck.
	Radioactive Waste Management Complex (RWMC)	\$260 ft^3	
	ICDF	\$0 [a]	Transportation cost is approximately \$2,200/truck.
	NTS/Hanford	\$6/ft^3/Hanford to be determined (TBD)	
2. Radiation only with >10 nCi/g but <100 nCi/g TRU	NTS/Hanford	\$6/ft^3/Hanford TBD	Transportation cost is approximately \$2,200/truck.
3. Radiation only with >100 nCi/g TRU	Waste Isolation Pilot Plant (WIPP)	NA	WIPP is directly funded to perform transportation and disposal. However, the cost of characterization alone for a 55-gal drum of sludge to meet the WIPP WAC is between \$30K and \$40K. Transportation is unknown at this time.
4. Radiation with < 10 nCi/g TRU and characteristic [b]	Envirocare	\$20K minimum charge \$34/ft^3 direct disposal \$232/ft^3 for stabilization (cost is much higher for high mercury waste)	Will accept stabilized waste but would macro any waste that has already been macro-encapsulated. Organic concentrations would have to be <2 times the treatment standard. Transportation cost is approximately \$1,300/truck.
	ICDF	\$0 [a]	
5. Radiation with >10 nCi/g but <100 nCi/g TRU and characteristic	None[c]	NA	If the waste is treated to remove the codes, then it could go to NTS or Hanford. Cost for disposal at Hanford is about \$15/ft^3. If the waste was destined for disposal at Hanford, it would need to have additional evaluation for the State of Washington "dangerous wastes."
6. Radiation with >100 nCi/g TRU and characteristic [d]	WIPP	NA	WIPP is directly funded to perform transportation and disposal. However, the cost of characterization alone for a 55-gal drum of sludge to meet the WIPP WAC is between \$30K and \$40K. Transportation is unknown at this time.
7. Radiation with <10 nCi/g TRU and listed [b]	Envirocare	\$20K minimum charge \$34/ft^3 direct disposal \$232/ft^3 for stabilization	Will accept stabilized waste but would macro any waste that has already been macro-encapsulated. Organic concentrations would have to be <2 times the treatment standard. Transportation cost is approximately \$1,300/truck.
	ICDF	\$0 [a]	

Table 4-1. (continued).

Waste Stream	Disposal Options	Estimated Costs	Comments
8. Radiation with >10 nCi/g but <100 nCi/g TRU and listed	None[c]		If the waste is treated to remove the codes, then it could possibly go to NTS or Hanford. Cost for disposal at Hanford is about $15/ft^3$. If the waste were destined for disposal at Hanford, it would need to have additional evaluation for the State of Washington "dangerous wastes."
9. Radiation with >100 nCi/g TRU and listed [d]	WIPP	NA	WIPP is directly funded to perform transportation and disposal. However, the cost to characterize a 55-gal drum of sludge to meet the WIPP WAC is between $30K and $40K. Transportation at this time is unknown.
10. Radiation with <10 nCi/g TRU and PCBs	Envirocare	$20K minimum charge $34/ft^3$ direct disposal $232/ft^3$ for stabilization	Will accept stabilized waste but would macro any waste that has already been macro-encapsulated. PCBs must be <500 ppm. Transportation cost is approximately $1,300/truck.
	ICDF	$0 [a]	PCBs must be <500 ppm
	RWMC	$260 ft^3$	PCBs must be <50 ppm
11. Radiation with >10 nCi/g but <100 nCi/g TRU and PCBs	None[c]		
12. Radiation with >100 nCi/g TRU and PCBs [d]	WIPP	NA	WIPP is directly funded to perform transportation and disposal. However, the cost to characterize a 55-gal drum of sludge to meet the WIPP WAC is between $30K and $40K. Transportation at this time is unknown.

a. The cost for disposal is covered in the facility's operating costs and there is no disposal charge to the customer.

b. Argonne National Laboratory-West, Waste Control Specialists (Oak Ridge – transportation cost is approximately $4,000/truck), Permafix (Gainesville, FL – transportation cost is approximately $4,900/truck), or Envirocare can treat these wastes.

c. At the present time, there are no disposal options for these orphan wastes. However, both the NTS and Hanford are pursuing approval of a mixed waste cell for those wastes generated outside Nevada and Washington

d. The Advanced Mixed Waste Treatment Facility (AMWTF) will be able to treat these wastes in the future. The cost for treatment at the AMWTF is unknown at this time.

Note: All transportation costs are for approved radioactive material/hazardous material carriers. If the carrier is not approved, additional costs would apply to conduct a carrier assessment. The transportation costs are only for transportation to the treatment facility and does not include transportation to the disposal facility.

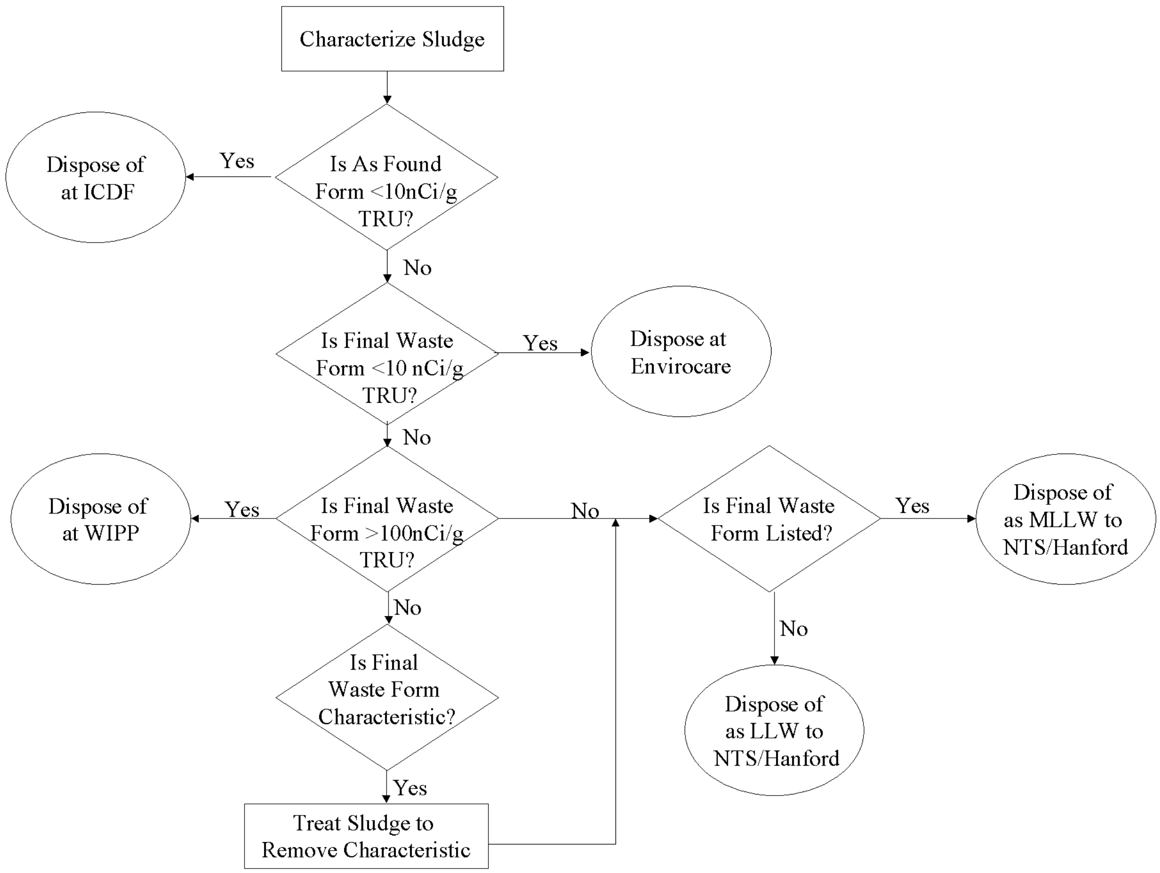


Figure 4-1. Waste disposal decision process for the SFE-20 tank waste.

waste boxes, 55-gal drums, or 85-gal drums, pretreatment and packaging would need to be done before shipment to WIPP. Also, if any grout is added to the waste, the concentrations of TRU isotopes will most likely be <100 nCi/g. Therefore, the waste would no longer be TRU and would not meet the WIPP WAC. With these obstacles in mind, it has been determined that disposal as TRU waste at the WIPP is most likely not a viable disposal option.

4.3.3 Nevada Test Site/Hanford

Currently, there are no disposal options for wastes that contain >10 nCi/g but <100 nCi/g of TRU isotopes and are hazardous. However, both the Nevada Test Site (NTS) and Hanford are currently pursuing solid waste environmental impact statements (SWEISs) to open mixed waste cells for wastes generated outside Nevada and Washington. The SWEISs are expected to be approved and the receipt of mixed waste would begin sometime between June and December of 2003. As shown on the decision process, (Figure 4-1), if the SFE-20 final waste form contains TRU isotopes >10 nCi/g but <100 nCi/g and contains hazardous waste, the mixed waste cell disposal sites at NTS and Hanford will be evaluated for disposal of the final waste form. Assuming the packaging requirements for the NTS and Hanford for the new mixed waste cells are similar to that of their current WACs, NTS would be the preferred disposal option. This is because Hanford requires additional evaluation of the waste for Washington dangerous waste constituents and the cost for disposal at Hanford is more than twice the cost at the NTS. A drawback to disposal at NTS is the fact that the NTS WAC packaging requirements allow for use of specific-sized containers such as 4 × 4 × 7-foot or 4 × 2 × 7-foot boxes or 55-gal drums. However, alternate packages will be considered upon consultation with NTS personnel to ensure equipment compatibility. There is also a package weight limit that must not exceed 9,000 lb. The grouted SFE-20 tank dimension and weight estimates are 6 × 6 × 10-ft and approximately 13,000 lb, which may be incompatible with the NTS or Hanford WAC. In summary, if disposal at the NTS or Hanford becomes the required disposal pathway, the disposal facility's WAC (when the SWEIS is approved and implemented) will need to be evaluated prior to treatment of the SFE-20 waste to ensure the final waste form will meet the applicable WAC.

4.3.4 Envirocare

At this time, Envirocare is the most likely option for disposal of the waste contained within the tank if the final waste form is <10 nCi/g TRU isotopes, as required by the Envirocare WAC. Although the ICDF WAC could allow receipt of the final waste form if the TRU isotope activity is <10 nCi/g, the ROD prohibits receipt of the waste at the ICDF due to the "as found" activity being >100 nCi/g of TRU isotopes or alpha LLW. The waste will be sent to Envirocare for disposal, assuming all requirements of the Envirocare WAC can be met.

4.4 Recommended Final Disposal Option

The recommended disposal facility option for the VES-SFE-20 tank sludge and possibly the tank will be Envirocare. The recommended disposal facility option for the debris wastes from the remediation of the tank and surrounding area has been determined to be the ICDF. These decisions are based on the following criteria:

- On-Site treatment of the debris wastes meets the ROD Declaration.
- Removal and treatment off-Site of the sludge meets the ROD Declaration.
- Disposal of the debris wastes at the ICDF meets the ROD Declaration for the preferred disposal site.
- The PCB concentrations in the wastes will be below the WAC limit for the disposal site.
- The final waste forms will have concentrations of transuranics below 10 nCi/g.

Alternatively, NTS and Hanford are viable options if the waste form is greater than 10 nCi/g. In this case, it is anticipated that negotiations will be required to meet the Hanford or NTS WAC.

4.5 Compliance with the OU 3-13 Record of Decision

The 1999 ROD (DOE-ID 1999) selected a remedy for the VES-SFE-20 Hot Waste Tank System. The remedy is described in two places in the ROD: the ROD Declaration and the ROD Decision Summary (Section 1). The first description on Page x is the declaration of the selected remedy. The second description of the selected remedy is found in Section 11.1.7. Both descriptions of the preferred alternative from the ROD are given in Section 2.1 of this document.

The preferred approach to response action reflects the remedy selected in the OU 3-13 ROD (i.e., removal, treatment, and disposal). There are a few differences from the description of the remedy in the ROD decision summary, primarily due to the current absence of liquid in the tank. Table 4-2 describes how the recommended approach compares with the requirements of the ROD.

Table 4-2. ROD compliance matrix.

No.	ROD Statement	Source	Response Action Approach
1.	Remove and treat on-Site the liquid content of the tank.	ROD Declaration	The recent camera inspection of the tank revealed that there is no free liquid in the tank. Treatment of the tank liquid is therefore moot. If liquids are generated as secondary waste as part of the response action, the liquid will be treated at the INTEC PEW Evaporator Facility, using a portable evaporator, or treated through stabilization at the SFE-20 site. In any case, the treatment of secondary waste liquid will be accomplished on-Site at the INEEL. Disposal will either be through the PEW Evaporator Facility or at the ICDF landfill.
2.	Remove and treat on-Site the sludge content of the tank.	ROD Declaration	The primary concern with the tank sludge is the need to avoid excessive radiological exposure to workers from the high radiation field. The addition of a grout mixture to the tank will stabilize the sludge within the tank, while still in the ground. The tank will then be excavated and removed from the ground. This process will keep radiation exposures ALARA. The tank will be placed in a shipping/disposal box and additional grout will be added ex situ, as necessary, to reduce ALARA concerns at the base of the tank and to eliminate void space.
3.	Excavate and remove the tank, vault, and associated structures.	ROD Declaration	The tank will be removed after grout is added. The vault, piping, and associated structures will be removed from the ground in Phase II of the response action.
4.	Land-dispose treated waste, the tank, vault, and other debris. The preferred disposal site is the ICDF; however, if any residue or material fails to meet the ICDF WAC, an alternative suitable disposal facility will be identified during remedial design.	ROD Declaration	The tank containing the treated sludge will be land-disposed at the ICDF only if the "as found" wastes are characterized as being neither as alpha-LLW or TRU wastes and ICDF WAC can be met. If the box containing the tank with grouted waste and additional void-filling grout is determined to be alpha-LLW or TRU, it will be shipped off-Site for further treatment and disposal. The vault and other debris that are removed from the ground will be disposed of at the ICDF. Any liquids that are generated as secondary waste during response action may be evaporated at the PEW and the residuals disposed of in accordance with PEW-generated wastes. If the PEW is not available or the PEW WAC cannot be met, the liquid will be treated in a portable evaporator or stabilized, and the residuals will be disposed of at the ICDF landfill, where they are expected to met the WAC.

Table 4-2. (continued).

No.	ROD Statement	Source	Response Action Approach
5.	Remove and treat off-Site if wastes found in the tank are alpha LLWs or TRU wastes.	ROD Declaration	The sludge in the tank is assumed to have a total TRU concentration of greater than 10 nCi/g and less than 100 nCi/g, based on 1984 analytical data. The sludge is therefore likely to be an alpha-contaminated LLW. The sludge will be sampled and analyzed prior to the addition of grout so that its hazardous waste status and radiological content can be determined more definitively. Based on characterization, wastes that are determined to be alpha LLWs or TRU wastes will be managed in accordance with the OU 3-13 ROD. Specifics associated with the management of all wastes, including alpha LLWs or TRU wastes will be identified in the RD/RA WP.
6.	Institutional Controls until the removal of the tank liquid and sludge.	ROD Decision Summary-Description of Remedy	Institutional controls are currently in place and will be continued until response action is completed. If the portion of the vault that is left in place is determined to pose an unacceptable risk to receptors under an unrestricted land use scenario, then institutional controls will be continued until the risk is reduced to acceptable levels.
7.	Sampling the tank contents.	ROD Decision Summary-Description of Remedy	Sampling of the solid tank contents will be accomplished before grout is added to the sludge. This sampling will be conducted to determine the best grout formulation and to determine if WAC can be met through grouting.
8.	Removal and ex situ treatment of the tank liquid and sludge.	ROD Decision Summary-Description of Remedy	The removal and treatment of the tank liquid is no longer necessary due to the newly discovered absence of liquid in the tank. The treatment of the tank sludge consists of two steps. The first step is the in situ grouting of the tank, before removal from the ground. The addition of this in situ step is warranted based on the need to minimize radiation exposure and safety risk to workers. The second step will include additional ex situ grouting of the tank within the shipping/disposal box. The second stabilization step is necessary to address ALARA concerns associated with the tank after it has been filled with grout and also to ensure there is no void space in the box. As treatment specifically "ex situ" is not identified as a requirement in the ROD Declaration, the inclusion of an in situ treatment step is considered neither significant nor fundamental.

Table 4-2. (continued).

No.	ROD Statement	Source	Response Action Approach
9.	Excavation and removal of the tank, tank vault, pump pit enclosures, and other associated structures.	ROD Decision Summary-Description of Remedy	The ROD Decision Summary clarifies that other than the tank liquid and sludge, the remaining components of the tank system will be excavated and removed, "depending on the waste characteristics." This implies that, if the tank system components meet risk-based cleanup goals, the tank system components may be left in the ground The vault, piping, and associated structures will be removed from the ground during Phase II of the project, with the exception of those parts that meet risk-based cleanup goals.
10.	On-Site disposal of the tank and associated structures.	ROD Decision Summary-Description of Remedy	The tank will be disposed of at the ICDF only if the "as found" wastes are characterized as being neither alpha-LLWs or TRU wastes and the ICDF WAC can be met. Additional associated structures that are removed from the ground will be disposed of at the ICDF if the ICDF WAC can be met.
11.	If the PEW Evaporator Facility is unable to accept the liquid waste or is unavailable at the time the response action is conducted, a small portable evaporator unit would be utilized on-Site; or the waste would be disposed of off-Site in accordance with the Off-Site Rule (40 CFR 300.440).	ROD Decision Summary-Description of Remedy	Recent camera inspection of the tank interior reveals little or no liquid in the tank. The only liquid wastes now anticipated may be small amounts of water and secondary waste generated during the response action. Previous to the camera entry when 400 gal of water was thought to be in the tank, the PEW Evaporator Facility was identified as the preferred location for treatment and disposal of the liquid. The only liquid anticipated to be found in the tank is trace amounts of water interstitial with the sludge. This liquid will not be separated and will be grouted and disposed of with the sludge. Therefore, the use of grouting for the liquids is not considered a significant nor fundamental change to the ROD.

The most significant deviation from the ROD is that the waste in the tank is assumed to be alpha-contaminated low-level waste (LLW), based on existing analytical data, and on-Site disposal is planned at the ICDF. The ROD requires that if the waste found in the tank is alpha-contaminated LLW, the waste must be removed and treated off-Site. However, due to high radiation field associated with the sludge and the need to meet as low as reasonably achievable (ALARA) requirements, the waste will be grouted within the tank prior to removal of the tank from the ground. Once removed from the ground, the tank will be placed in a shipping/disposal box and further surrounded by grout to reduce the radiation field and to eliminate void space. Once this is done, the container with the grouted waste will no longer comprise an alpha-contaminated LLW because the concentration of transuranics will be below 10 nCi/g. Therefore, disposal is planned at the ICDF, on-Site. This deviation from the ROD is considered significant, but does not represent a fundamental change. If the agencies determine it to be necessary, an Explanation of Significant Difference will be issued to inform the public of the change from this ROD requirement.

5. EXCAVATION APPROACH

Excavation and removal of the VES-SFE-20 Tank System, plus any contaminated underlying soils, are complicated in that active structures and utilities exist near the excavation site. In addition, the tank is located approximately 20 ft below grade with the vault floor extending even deeper. An active concrete pipe corridor supporting operation of VES-SFE-106 was constructed over a portion of the VES-SFE-20 vault and doweled into the foundation of CPP-642, further complicating removal. As a result, the excavation approach for the removal of the VES-SFE-20 Tank System will consist of two phases (see Drawings D-1 to D-3 in Appendix B). During Phase I, the tank, its contents, and piping within the vault will be removed. Phase II will consist of removing the concrete structures including the vault, tunnel, and pump pit, as well the remaining piping, CPP-642 building, and any contaminated underlying soils. Phase II removal will be coordinated following the closure or D&D&D of VES-SFE-106 and CPP-648.

5.1.1 Phase One Excavation

Phase I excavation will be a continuation of the tank content removal process and will consist of removing the tank and piping from within the tank vault. First, numerous abandoned lines located above the VES-SFE-20 tank vault will be located and removed, as required (see Drawing U-2 in Appendix B). Next, the vault roof will be uncovered by excavation. Trench boxes, shoring, or sloping will be necessary because of the depth of excavation and the large area required for removal of the vault roof. Coring or cutting a small hole through the vault roof will establish an access to the tank as part of the tank contents removal/stabilization operation. The hole would be centered over the flange on the top of the tank. Immediately following tank content removal/stabilization, the vault roof will be removed as well as the tank. Depending on the status of VES-SFE-106, Phase II of the excavation will commence or a temporary metal or precast concrete roof will be placed over the vault and the area backfilled. The site will be returned to a safe condition until the commencement of the Phase II excavation.

5.1.2 Phase Two Excavation

Phase II excavation activities will consist of removing the concrete structures, including the vault, tunnel, and pump pit, as well the remaining piping, CPP-642 building, and any contaminated underlying soils (see Drawings D-1 to D-3 in Appendix B).

The CPP-642 building is currently not in operation or service, but contains utilities and structures that support adjacent waste holding tanks, which are routed through and adjacent to CPP-642. Specifically, the active utilities include air and power distribution to CPP-1677 (VES-SFE-126) and CPP-648 (VES-SFE-106). Active systems will require rerouting prior to removal of CPP-642. In addition, numerous active and abandoned lines cross through the area, which pose interference for shoring systems and excavation equipment. These lines will be identified and rerouted or cut and capped outside the excavation area.

As stated above, an addition to the valve pit that supports CPP-648 (VES-SFE-106) was constructed directly north of the VES-SFE-20 vault. This concrete pipe corridor was doweled into the VES-SFE-20 vault roof and the northwest corner of the CPP-642 pump house. A portion of the corridor sits directly above the north end of the VES-SFE-20 vault. Thus, a portion of the pipe corridor will require removal with the VES-SFE-20 tank vault. In addition, abandoned sample lines running from the CPP-648 pump house and entering the north side of the VES-SFE-20 vault are located beneath the CPP-648 valve pit addition. To reduce the volume of pipe corridor removal, an attempt to "pull" the sample lines from underneath the structure may be performed. Alternatively, a portion of the sample lines could be abandoned in-place.

Shoring or other braced excavation systems will be mandatory to remove the vault and pump pit, primarily due to the overall depth of excavation and close proximity of other structures. The bottom of the tank vault is in excess of 20 ft below grade and, when considering removing under burden soils for several more feet, an excavation at the top surface would be in excess of 70 ft in diameter if the sides were sloped. For this reason, sheet piles or similar braced excavation systems must be used to facilitate the excavation process. Due to the area being congested by other structures, shoring and structure removal will most likely be sequenced in phases (i.e., pump pit removal followed by vault removal).

As each of the concrete structures is removed, the underlying soil will be sampled and removed as required. It is assumed that contaminated soil will only be removed from within the shored area, and not "chased" outside the soil/shoring interface. If contaminated soil is found and extends beyond the line of shoring, it will be recorded and later removed as part of the OU 3-13, Group 3, Remedial Action.

Significant safety risks are associated with deep excavations in congested areas. Issues associated with sheet piles primarily deal with striking submerged large dense objects, such as basaltic rubble, unidentified abandoned pipes etc. It is possible upon encountering such an object that the sheet pile can be deflected into a 90-degree bend, which could cut into the vault during construction of the wall.

6. ARAR EVALUATION

Compliance with action, chemical, and location-specific applicable or relevant and appropriate requirements (ARARs) for the selected remedy for the VES-SFE-20 Hot Waste Tank System is summarized in Table 6-1. ARARs were established in the OU 3-13 ROD. Subsequently, ARARs were reiterated in the RD/RA Scope of Work for WAG 3 (DOE-ID 2000b). The discussion below is a refinement of those ARARs based on the remedial action approach recommended in this Title I design. In addition, all of the ARARs established in the ROD under IDAPA Chapter 16 have been converted to Chapter 58, in accordance with the change in Idaho regulations. Section 6.5 is included below to describe newly identified additional requirements that will serve as design requirements, but that are not ARARs because they were not identified in the ROD.

For this ARAR and other requirements analysis, the tank was assumed to contain characteristic hazardous waste. The waste is also assumed to have a total PCB concentration below 10 ppm, such that no PCB requirements will apply. Based on previous analysis of the tank contents, it is further assumed that the tank waste presently has a concentration of TRUs below 100 nCi/g, such that it is not TRU waste. The tank waste is assumed to contain a concentration of TRUs greater than 10 nCi/g and less than 100 nCi/g, making the waste an alpha-contaminated LLW. Further, based on recent video footage of the tank contents, it is assumed that the previously observed liquid is no longer present and that only sludge remains in the tank.

6.1 Action-Specific ARARs

Idaho fugitive dust emissions rules, Idaho rules for the control of air pollution, and National Emission Standards for Hazardous Air Pollutants (NESHAP) requirements will be met using institutional and engineering controls during excavation, treatment, and disposal of the SFE-20 tank system and waste. The VES-SFE-20 Hot Waste Tank System was previously closed and abandoned in 1976, and therefore, was not used as a RCRA tank storage unit. Excavated tank system components and underlying soils will be managed as remediation waste within the area of contamination (AOC). The sludge waste will solidified/stabilized prior to removal of the tank from the ground. Since the tank system components and other wastes occur within the WAG 3 AOC and are considered remediation waste, they can be disposed of in the ICDF without triggering land disposal restrictions (LDRs) or minimum technical requirements. The debris and soil will be managed in remediation waste staging piles within the AOC prior to disposal at the ICDF. Any tank system components that are treated will be subject to LDRs. Liquid wastes that are treated to meet the ICDF WAC will also be subject to LDRs. The LDR ARAR that was identified in the ROD has been refined to a greater level of detail in Table 6-1.

If the VES-SFE-20 tank components and waste are determined to be hazardous and are removed, treated, and disposed off-Site, then the CERCLA "Procedures for Planning and Implementing Off-Site Response Actions" under 40 CFR 300.440 apply. The criteria specified for the off-Site response actions will be met by shipping remediation wastes only to a permitted RCRA Subtitle C facility that prevents releases of hazardous waste, hazardous constituents, or hazardous substances to groundwater, surface water, soil, or air. The wastes will only be shipped if they meet, or can be treated to meet, the receiving facility's WAC.

Table 6-1. Compliance with ARARs for Group 7, VES-SFE-20 Hot Waste Tank System, selected remedy.

Category	Alternative/ARARs Citation	Description	Applicable or Relevant and Appropriate or to be Considered (TBC)	Comments
Group 7—VSE-SFE-20 Hot Waste Tank System: Removal, Treatment, and On-Site Disposal				
Action-specific ARARs				
Rules for the Control of Air Pollution in Idaho	IDAPA 58.01.01.650, 58.01.01.651	Idaho fugitive dust emissions	Applicable	Will be met using engineering controls during tank waste and system removal.
	IDAPA 58.01.01.585, 58.01.01.586	Toxic air emissions	Applicable	Will be met using engineering controls during tank waste and system removal.
NESHAP	40 CFR 61.92, 61.93	Radionuclide emissions from DOE facilities, emissions monitoring, emissions compliance	Applicable	Will be met using engineering controls during tank waste and system removal.
RCRA- Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Units	IDAPA 58.01.05.008 [40 CFR 264.193(b)]	Secondary containment and detection of releases	Applicable	Applies if hazardous wastes are pumped or transferred to a treatment system.
	IDAPA 58.01.05.008 (40 CFR 264.553)	Temporary units	Applicable	Applies to any tank components or soils that are excavated.
	IDAPA 58.01.05.008 (40 CFR 264.554)	Remediation waste staging piles	Applicable	Applies to any tank components or soils that are excavated.

Table 6-1. (continued).

Category	Alternative/ARARs Citation	Description	Applicable or Relevant and Appropriate or to be Considered (TBC)	Comments
	IDAPA 58.01.05.008 (40 CFR 264 Subpart X)	Miscellaneous units	Applicable	Establishes miscellaneous units, as necessary, and provides for the application of hazardous waste tank regulations to units used to remove, treat, and manage waste removed from the tank and piping. With the recommended approach, waste will be grouted within in the existing tank and the tank will be removed and placed in a shipping/disposal box at the ground surface. Additional grout will be added to the box as needed to eliminated void space and reduce ALARA concerns. The shipping/disposal container is not considered a miscellaneous unit. Miscellaneous units may be established, if needed, for the stabilization and management of secondary wastes generated during remediation
LDRs	IDAPA 58.01.05.011 (40 CFR 268.40(a,b,e))	LDRs treatment standards	May be applicable	If placement is triggered, LDRs will apply.
	IDAPA 58.01.05.011 (40 CFR 268.45(a,b,c,d))	Treatment standards for hazardous debris	May be applicable	If placement is triggered, LDRs will apply.
	IDAPA 58.01.05.011 (40 CFR 268.48(a))	Universal treatment standards	May be applicable	If placement is triggered, LDRs will apply.
	IDAPA 58.01.05.011 (40 CFR 268.49)	Alternative LDR treatment standards for contaminated soil	May be applicable	If placement is triggered, LDRs will apply.

Table 6-1. (continued).

Category	Alternative/ARARs Citation	Description	Applicable or Relevant and Appropriate or to be Considered (TBC)	Comments
CERCLA Procedures for Off-Site Response Actions	40 CFR 300.440	CERCLA off-Site policy	Applicable if wastes are shipped off-Site	Sets requirements for off-Site treatment, storage, and disposal facilities to ensure suitability.
Chemical-specific ARARs				
RCRA – Standards Applicable to Generators of Hazardous Waste	IDAPA 58.01.05.005 (40 CFR 261.20 through 24)	Hazardous waste characteristics identification	Applicable	Applies only to hazardous liquids or sludges in the tank system or underlying soils that may have been impacted by a release.
	IDAPA 58.01.05.006 (40 CFR 262.11)	Hazardous waste determination	Applicable	A hazardous waste determination is required for the waste, tanks, piping, and any secondary waste generated during remediation.
Asbestos	40 CFR 61 Subpart M, 61.145, 61.150; 61.156	Asbestos regulations	Applicable	Substantive requirements will be met.
Location-specific ARARs				
	None identified			
TBCs				
	DOE Order 435.1	Radioactive waste management performance objectives to protect workers	TBC	Substantive requirements will be met by administrative and engineering controls during excavation, removal, treatment, and disposal of the tank system and contents.
	DOE Order 5400.5, Chapter II 1(a,b)	Limits effective dose to public from exposure to radiation sources and airborne releases	TBC	Will be met by administrative and engineering controls during excavation, removal, treatment, and disposal of the tank system and contents.

6.2 Chemical-Specific ARARs

Tank wastes, underlying soils, and secondary wastes generated during remediation will be characterized to determine if hazardous constituents or characteristics are present. The results of the hazardous waste characterization will be used to facilitate proper management and disposal of these materials at either the ICDF or off-Site. Asbestos regulations cited in the table apply and will be met by managing asbestos debris generated during demolition and removal of the tank vault, pump pit, and associated structures in accordance with all substantive provisions of the regulations.

6.3 Location-Specific ARARs

There are no location-specific ARARs.

6.4 To Be Considered Requirements

Two TBCs were identified in the ROD. DOE Orders 435.1 and 5400.5 provide guidance on radiological human health and environmental protection requirements, on cleanup and management of residual radioactive material, and the release of property. Radiation exposures to the public, workers, and the environment will be kept ALARA as required by these orders. These performance objectives will be met through monitoring and administrative and engineering controls to minimize exposures.

Specific dose limits to the public defined in DOE Order 5400.5 will be met through monitoring and administrative and engineering controls as required during excavation and construction in contaminated areas.

6.5 Additional Requirements (Non-ARARs)

Typically, as a project moves from the remedy selection phase to the design phase, additional requirements are identified as the details of the remedy are developed. These additional requirements are not ARARs because they were not identified in the ROD and have not been formalized in a post-ROD primary document. However, it is important to identify these additional requirements at this point in the design effort to ensure that the remedy design will be compliant. These additional requirements are presented in Table 6-2 to facilitate discussion among the Agencies with the goal of reaching an agreement on the complete set of design requirements as early in the process as possible.

Assuming the tank contents are hazardous, additional requirements have been identified that pertain to the treatment and management of hazardous waste in the AOC. These requirements include site security, inspections, training, preparedness and prevention, contingency plan and emergency procedures, equipment decontamination, and the use and management of containers. A requirement has been identified for general waste analysis (IDAPA 58.01.05.008), which adds analysis requirements for the soils, wastes, tanks, piping, and secondary waste generated during remediation.

Table 6-2. Additional requirements for the VES SFE-20 remedy.

Category	Regulatory Citation	Description	Comments
Rules for the Control of Air Pollution in Idaho	IDAPA 58.01.01.161	Toxic substances	Based on the predicted, but unknown, hazardous constituent content of the waste, it is assumed that this requirement relevant to toxic substances is applicable. Will be met using engineering controls during tank waste and system removal.
	IDAPA 58.01.01.500.02	Requirements for portable equipment	The remedy approach includes the use of portable equipment for on-Site treatment. Will be met using engineering controls during use of portable equipment.
NESHAP	40 CFR 61.94(a)	Radionuclide emissions from DOE facilities, emissions monitoring, emissions compliance	Based on the radiological content of the waste, it is assumed that radionuclide emissions are possible. Will be met using engineering controls during tank waste and system removal.
RCRA- Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Units	IDAPA 58.01.05.008 (40 CFR 264.13 (a) (1-3)	General waste analysis	Analysis requirements apply to the soils, waste, tank, piping, and secondary waste generated during remediation.
	IDAPA 58.01.05.008 (40 CFR 264.14)	Security of site	Measures must be taken to restrict access to the site during excavation, removal of the waste, tank, and piping, and decontamination.
	IDAPA 58.01.05.008 (40 CFR 264.15)	General inspections	Regular inspections must be performed during remediation.
	IDAPA 58.01.05.008 (40 CFR 264.15)	Personnel training	All personnel involved in soil excavation, removal of the waste, tanks, and piping and decontamination must be trained.
	IDAPA 58.01.05.008 (40 CFR 264, Subpart C)	Preparedness and prevention	Applies to soil excavation, waste, tank system removal, and decontamination activities.

Table 6-2. (continued).

Category	Regulatory Citation	Description	Comments
	IDAPA 58.01.05.008 (40 CFR 264, Subpart D)	Contingency plan and emergency procedures	Applies to soil excavation, waste, tank system removal, and decontamination activities.
	IDAPA 58.01.05.008 (40 CFR 264.114)	Equipment decontamination	All equipment used during remediation must be decontaminated if hazardous waste is contacted.
	IDAPA 58.01.05.008 (40 CFR 264.171-178)	Use and management of containers	Applicable to soils, waste, tank, piping, and any secondary hazardous waste generated during remediation that is managed in containers.

7. REMEDIAL DESIGN AND REMEDIAL ACTION IMPLEMENTATION PLAN

The purpose of this plan is to outline the general work scope required for development of the RD/RA WP. This plan assumes that the 30% design, as submitted in this document, does not radically change and that no additional design-basis development is required other than that identified in the body of this document.

7.1 Remedial Design Activities

The remedial design activities will include the comment incorporation on the draft 30% design and production of the final 30% design submittal to the Agencies. Typical key documents that will be developed (which are part of the RD/RA WP submittal) include the Storm Water Pollution Prevention Plan, Sampling and Analysis Plan, Waste Management Plan, Health and Safety Plan, Treatability Test Work Plan, and auditable safety analysis.

7.2 Remedial Action Activities

Significant work elements that compose this action include the following:

- Rerouting of existing active utilities to provide access to the pump pit and tank vault
- Excavation and shoring required to remove the vault, tank, and any contaminated soil that may be encountered
- Removal and treatment of the tank contents including any liquid that may be found in the vault and pump pit
- Removal and disposal of the tank, process equipment, structures, and contaminated soil
- Decontamination.

7.2.1 RD/RA Work Plan Contents

The proposed table of contents for the Group 7 RD/RA WP is outlined below

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5.4 Field Oversight/Construction Management

5.5 Project Cost Estimate

5.6 Project Schedule

5.7 Inspections

5.7.1 Prefinal Inspection

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5.7.3 Final Inspection

7.2.2 Cost Estimate

The SFE-20 tank will be cleaned-up and disposed of in two phases. Phase I includes excavating down to the tank vault and removal of the vault lid. The tank contents will be mixed with grout and allowed to cure. Then the tank will be lifted out of the vault, placed in a waste box, and grouted inside the box. The waste box with the tank inside will be disposed of on-Site and the excavation will be temporarily covered. Phase I costs are as follows:

Step 1	Characterization	$147,849
Step 2	Grout Tank	$48,808
Step 3	Remove Vault Roof	$135,661
Step 4	Remove Tank	$27,005
Step 5	Clean Vault	$18,977
Step 6	Grout Box W/Tank	$27,132
Step 7	Remove Tent and Fill Hole	$40,443
Construction Support		$181,152
Other Costs		$112,036
Total Phase I		$739,152

Phase II will be performed at a later date, when CPP-648 and all associated piping are taken out of service. Phase II activities will consist removal of the remainder of the SFE-20 system. When all of the structures have been removed, the hole will be back-filled to original grade with clean fill. Phase II costs are as follows:

Step 1	Demo CPP-642	$66,397
Step 2	Excavate to Elevation –12'	$98,360
Step 3	Demolish part of Pipe Corridor	$215,264
Step 4	Drive Piles/Excavate To Bottom of Vault	$50,599
Step 5	Demolish Pump Pit and Vault	$516,670
Step 6	Remove Tent and Fill Hole	$76,493
Construction Support		$246,555
Other Costs		$148,506
Total Phase II		$1,418,844

Costs shown for both Phase I and II are construction costs only and do not include any BBWI design costs. The total construction cost of Phase I and Phase II is $2,158K. Design costs, which also consist of preparing the Remedial Design/Remedial Action Work Plan and associated documents and reviews, are estimated at approximately $1,100K for a total of approximately $3.2M. Details of the cost estimate for Phase I and Phase II can be found in Appendix C.

7.2.3 RD/RA Schedule

The amended RD/RA schedule is shown in the attached schedules (see Appendix D). There are no changes to any of the enforceable milestones or corresponding Scope of Work working plan milestones, only added detail work scope related to the activities identified above.

8. REFERENCES

40 CFR 61.94(a), 2001, "Compliance and Reporting," *Code of Federal Regulations*, Office of the Federal Register, July 2001.

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Appendix A

TRU Calculations for SFE-20 Waste Tank

EDF-2360, Rev. 0

Document ID: EDF-2360
Revision ID: 0
Effective Date: 08/30/02

Engineering Design File

TRU Calculations for SFE-20 Waste Tank

Prepared for:
U.S. Department of Energy
Idaho Operations Office
Idaho Falls, Idaho

Idaho National Engineering and Environmental Laboratory

Form 412.14
07/24/2001
Rev. 03

431.02
02/26/2002
Rev. 10

ENGINEERING DESIGN FILE

EDF- 2360
Rev. No. 0
Page ~~1 of 2~~

1. Title: TRU Calcualtions for SFE-20 Waste Tank				
2. Project File No.:				
3. Index Codes: Building/Type CPP-602 SSC ID N/A Site Area INTEC				
4. Summary: This engineering design file documents the derived concentrations of Am-241 and Np-237 in the SFE-20 Waste Tank in relation to the analytically determined Pu concentration obtained from a 1984 sampling event. The derived Am-241 and Np-237 concentrations were summed with the Pu-238 and Pu-239 concentrations (the predominant TRU isotopes in INTEC waste streams) to determine if the solids exceed the 100 nCi/g Transuranic (TRU) waste disposal limit.				
5. Review (R) and Approval (A) and Acceptance (Ac) Signatures: (See instructions for definitions of terms and significance of signatures.)				
	R/A	Typed Name/Organization	Signature	Date
Author		Ken Brewer	K. Brewer	7/18/02
Checker	R	Pat Troescher	Pat Troescher	7/18/02
Independent Peer Reviewer	A	W. Rick Horne	W Rick Horne	8/2/02
Doc. Owner	A	Randy Rice	R. Rice	7/24/02
Requestor	Ac	Randy Rice	R. Rice	7/24/02
Doc. Control	A	Jennifer Dalton/ER	Jennifer Dalton	9/3/02
6. Distribution: (Name and Mail Stop)				
7. Does document contain sensitive unclassified information? ☐ Yes ☐ No. If Yes, what category:				
8. Can document be externally distributed? ☐ Yes ☐ No				
9. Uniform File Code: Disposition Authority: Record Retention Period:				
10. For QA Records Classification Only: ☐ Lifetime ☐ Nonpermanent ☐ Permanent. Item and activity to which the QA Record apply:				
11. NRC related? ☐ Yes ☐ No				
12. Registered Professional Engineer's Stamp (if required)				

TRU Calculations for SFE-20 Waste Tank

1. INTRODUCTION

SFE-20 Waste Tank is located in the Idaho Nuclear and Engineering Center's (INTEC) south basin area of CPP-603. The tank system was built in 1957 to collect low-level liquid wastes resulting from the receipt, storage and cutting of aluminum clad fuel from the Savannah River Test Reactor Program. The fuel cutting activities began in 1959 and lasted until 1962. Acid was added to tank SFE-20 at the end of the fuel cutting operations and the contents of the tank were heated in an attempt to dissolve any aluminum fuel fines resulting from the cutting process. The tank was practically isolated in 1976 and the remaining contents of the tank were sampled in 1984 for the purpose of characterization.[1]

Unfortunately, plutonium isotopes were the only TRU elements requested in the sample analysis of samples from SFE-20. Regulatory rules have changed since the 1984 sample request and the concentration of the other TRU elements is important so that a waste determination can be made on the tank solids. The predominant TRU isotopes at INTEC are Np-237, Pu-238, Pu-239 and Am-241. The Pu-238 and Pu-239 concentrations in SFE-20 solids were analytically determined from the samples taken in 1984.

2. METHODOLOGY

Am-241 and Np-237 activities in solids from SFE-20 were estimated by taking the ratio of Am-241 and Np-237 with respect to the total plutonium activity from the attached aluminum calcine source term calculated by Doug Wenzel (Attachment 1). These two ratios were used to determine the Am-241 and Np-237 activities in the SFE-20 solids using the analytically determined plutonium activity. Aluminum calcine was generated from aluminum fuel reprocessing raffinates. Therefore, the Am-241 to Pu_{total} and Np-237 to Pu_{total} ratios in the aluminum calcine source term should closely approximate those of the SFE-20 solids since this tank was associated with aluminum fuel cutting activities.

Wenzel reports the aluminum calcine source term for the year 2016. It is not known if Wenzel used 2016 as t_0 or a previous year. Pu-238 decay was ignored because of the uncertainty in Wenzel's t_0. Ignoring the Pu-238 decay may introduce a slight error in determining the Np-237/Pu_{total} and Am-241/Pu_{total} ratios. Pu-238 decay was also ignored when determining the overall TRU activity in the SFE-20 samples.

3. DATA

Total plutonium, activities and Pu-238 and Pu-239 percentages from samples taken in 1984 are shown in Table 1. Sample 12, sediment from the bottom 6 inches of the tank, contains the largest plutonium activity (approximately 93.5 nCi plutonium per gram of tank solids). These data are recorded in Analytical Laboratory Log Number 84-021529 (Attachment 2) and WINCO-1021 (Attachment 3).

Table 1. Plutonium Activities in Samples Taken from the SFE-20 Tank System.

Sample ID	Location	Type	Total Plutonium Activity	Percent Pu-238 Activity	Percent Pu-239 Activity
9	Floor – center section	Liquid	1.02E+02 pCi/mL	76 %	24 %
10	SFE-20 tank interior	Liquid	1.76E+02[a] pCi/mL	90 %	10 %
11	Floor – north end of vault	Dry solids	7.92E+04 pCi/gm	92 %	8.0 %
12	Bottom 6" of tank interior	Sediment	9.35E+04 pCi/gm	83 %	17 %
13	Bottom of pump pit	Wet solids	3.01E+03 pCi/gm	46 %	54 %

a. Table 2 of WINCO-1021 shows an incorrect activity for Sample 10. Data from Log 84-021529 is correct for this sample.

Np-237, Pu-238, Pu-239, and Am-241 activities taken from Wenzel's aluminum calcine source term are shown in Table 2. The magnitude of the Pu-238, Pu-239 or Pu_{total} activities may not agree with those activities shown in Table 1; however the ratio of Pu-238 and Pu-239 with respect to Pu_{total} should agree. As seen in Tables 1 and 2, the ratio of Pu-238 and Pu-239 activities with respect to the Pu_{total} tend to agree. There is a discrepancy in ratios for Sample 13 and the aluminum calcine source term. This discrepancy cannot be explained. Based on the general agreement of Pu-238 and Pu-239 ratios, Wenzel's aluminum calcine source term was determined to be satisfactory for calculating the Np-237Pu_{total} and Am-241/Pu_{total} ratios. These ratios were then be used to estimate the Np-237 and Am-241 activities in the SFE-20 samples taken in 1984.

Table 2. Np-237, Pu-238, Pu-239, Pu_{total}, and Am-241 Activities and Am-241 to Pu_{total} and Np-237 to Pu_{total} ratios in Aluminum Calcine Source Term.

Isotope	Activity (Ci/gm)	Ratios Based on Activity
Np-237	5.00E-09	Np/Pu_{total} = 2.34E-03
Pu-238	1.90E-06	Pu-238/Pu_{total} = 8.88E-01
Pu-239	2.40E-07	Pu-239/Pu_{total} =1.12E-01
Pu_{total}	2.14E-06	NA
Am-241	5.40E-07	Am/Pu_{total} =2.52E-01

4. RESULTS

Equations 1 and 2 below were used to estimate the Np-237 and Am-241 activities in the SFE-20 samples. The estimated N-237 and Am-241 activities are shown in Table 3. Table 4 shows the estimated TRU activity in the SFE-20 samples based on sum of the Pu_{total}, Np-237 and Am-241 activities.

Eq. 1 $\quad$ Np-237/$Pu_{\text{total for the specific SFE-20 sample}}$ = 2.34E-03

Eq. 2 $\quad$ Am-241/$Pu_{\text{total for the specific SFE-20 sample}}$ = 2.52E-01

Table 3. Estimated Np-237 and Am-241 Activities in SFE-20 Samples.

Sample ID	Np-237 Activity	Am-241 Activity
9	2.39E-04 nCi/mL	2.57E-02 nCi/mL
10	4.12E-04 nCi/mL	4.44E-02 nCi/mL
11	1.85E-01 nCi/gm	1.20E+01 nCi/gm
12	2.19E-01 nCi/gm	2.36E+01 nCi/gm
13	7.04E-03 nCi/gm (wet solids)	7.59E-01 nCi/gm (wet solids)

Table 4. Estimated TRU Activity in the SFE-20 Samples.

Sample ID	TRU Activity[a]
9	1.28E-01 nCi/gm
10	2.21E-01 nCi/gm
11	9.14E+01 nCi/gm
12	1.17E+02 n/Ci/gm
13	3.78E+00 nCi/gm

a. Assumed a density of 1 g/mL for Samples 9 and 10 to convert from nCi/mL to nCi/gram.

5. CONCLUSIONS

Samples 9, 10, 11, and 13 from SFE-20 are estimated to be below the 100 nCi/gram TRU waste limit, while Sample 12 is estimated to be above the 100 nCi/gram TRU limit. This EDF is not conclusive in determining whether the entire contents of the tank can be categorized as TRU waste.

6. REFERENCES

1. Analytical Laboratory Log 84-021529.

2. WINCO-1021, "Radiological Characterization and Decision analysis for the SFE-20 Waste Tank and Vault", September 1984.

Attachment 1

Aluminum Calcine Source Term

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Calculated Radionuclide Activities for Al Calcine in Ci/g as a Function of Decay Time

From Doug Wenzel (Wen-20-97)

			Decay Time Since 2016 (yr)				
Nuclide	Half-Life	Units	2016	2035	1.00E+02	5.00E+02	1.00E+03
(Actinides and Daughters)							
Tl207	4.77E+00	m	2.40E-11	2.70E-11	3.10E-11	3.20E-11	3.30E-11
Tl208	3.05E+00	m	2.50E-13	2.10E-13	7.90E-14	3.40E-15	1.80E-15
Tl209	2.20E+00	m	4.80E-16	5.10E-16	9.60E-16	7.10E-15	2.40E-14
Pb209	3.25E+00	h	2.20E-14	2.40E-14	4.40E-14	3.30E-13	1.10E-12
Pb210	2.23E+01	yr	4.30E-12	7.50E-12	2.70E-11	1.10E-10	2.10E-10
Pb211	3.61E+01	m	2.40E-11	2.70E-11	3.10E-11	3.20E-11	3.30E-11
Pb212	1.06E+01	h	6.90E-13	5.70E-13	2.20E-13	9.50E-15	5.00E-15
Pb214	2.68E+01	m	9.30E-12	1.30E-11	3.40E-11	1.10E-10	2.10E-10
Bi210MM	3.00E+06	yr	9.10E-29	9.10E-29	9.10E-29	9.10E-29	9.10E-29
Bi210	5.01E+00	d	4.30E-12	7.50E-12	2.70E-11	1.10E-10	2.10E-10
Bi211	2.13E+00	m	2.40E-11	2.70E-11	3.10E-11	3.20E-11	3.30E-11
Bi212	6.06E+01	m	6.90E-13	5.70E-13	2.20E-13	9.50E-15	5.00E-15
Bi213	4.57E+01	m	2.20E-14	2.40E-14	4.40E-14	3.30E-13	1.10E-12
Bi214	1.99E+01	m	9.30E-12	1.30E-11	3.40E-11	1.10E-10	2.10E-10
Po210	1.38E+02	d	4.30E-12	7.50E-12	2.70E-11	1.10E-10	2.10E-10
Po211	5.16E-01	s	6.60E-14	7.60E-14	8.80E-14	9.00E-14	9.30E-14
Po212	3.00E-07	s	4.40E-13	3.70E-13	1.40E-13	6.10E-15	3.20E-15
Po213	4.20E-06	s	2.20E-14	2.30E-14	4.30E-14	3.20E-13	1.10E-12
Po214	1.64E-04	s	9.30E-12	1.30E-11	3.40E-11	1.10E-10	2.10E-10
Po215	1.78E-03	s	2.40E-11	2.70E-11	3.10E-11	3.20E-11	3.30E-11
Po216	1.46E-01	s	6.90E-13	5.70E-13	2.20E-13	9.50E-15	5.00E-15
Po218	3.05E+00	m	9.30E-12	1.30E-11	3.40E-11	1.10E-10	2.10E-10
At217	3.23E-02	s	2.20E-14	2.40E-14	4.40E-14	3.30E-13	1.10E-12
Rn219	3.96E+00	s	2.40E-11	2.70E-11	3.10E-11	3.20E-11	3.30E-11
Rn220	5.56E+01	s	6.90E-13	5.70E-13	2.20E-13	9.50E-15	5.00E-15
Rn222	3.82E+00	d	9.30E-12	1.30E-11	3.40E-11	1.10E-10	2.10E-10
Fr221	4.80E+00	m	2.20E-14	2.40E-14	4.40E-14	3.30E-13	1.10E-12
Fr223	2.18E+01	m	3.30E-13	3.80E-13	4.30E-13	4.50E-13	4.60E-13
Ra223	1.14E+01	d	2.40E-11	2.70E-11	3.10E-11	3.20E-11	3.30E-11
Ra224	3.62E+00	d	6.90E-13	5.70E-13	2.20E-13	9.50E-15	5.00E-15
Ra225	1.48E+01	d	2.20E-14	2.40E-14	4.40E-14	3.30E-13	1.10E-12
Ra226	1.60E+03	yr	9.30E-12	1.30E-11	3.40E-11	1.10E-10	2.10E-10
Ra228	5.75E+00	yr	8.90E-17	9.00E-17	9.10E-17	9.60E-17	1.00E-16
Ac225	1.00E+01	d	2.20E-14	2.40E-14	4.40E-14	3.30E-13	1.10E-12
Ac227	2.18E+01	yr	2.40E-11	2.70E-11	3.10E-11	3.20E-11	3.30E-11
Ac228	6.13E+00	h	8.90E-17	9.00E-17	9.10E-17	9.60E-17	1.00E-16
Th227	1.87E+01	d	2.30E-11	2.70E-11	3.10E-11	3.20E-11	3.30E-11
Th228	1.91E+00	yr	6.90E-13	5.70E-13	2.20E-13	9.50E-15	5.00E-15
Th229	7.34E+03	yr	2.20E-14	2.40E-14	4.40E-14	3.30E-13	1.10E-12
Th230	7.70E+04	yr	4.90E-10	5.00E-10	5.10E-10	5.60E-10	6.30E-10
Th231	2.55E+01	h	1.00E-10	1.00E-10	1.00E-10	1.00E-10	1.00E-10
Th232	1.41E+10	yr	9.00E-17	9.00E-17	9.10E-17	9.60E-17	1.00E-16
Th234	2.41E+01	d	5.80E-12	5.80E-12	5.80E-12	5.80E-12	5.80E-12
Pa231	3.73E+04	yr	3.20E-11	3.20E-11	3.20E-11	3.20E-11	3.30E-11
Pa233	2.70E+01	d	5.00E-09	5.00E-09	5.00E-09	5.10E-09	5.10E-09

Pa234MM	1.17E+00	m	5.80E-12	5.80E-12	5.80E-12	5.80E-12	5.80E-12
Pa234	6.70E+00	h	7.60E-15	7.60E-15	7.60E-15	7.60E-15	7.60E-15
U232	7.20E+01	yr	6.70E-13	5.60E-13	2.20E-13	9.30E-15	4.90E-15
U233	1.59E+05	yr	7.00E-13	1.10E-12	3.30E-12	1.20E-11	2.30E-11
U234	2.45E+05	yr	1.50E-08	1.50E-08	1.50E-08	1.60E-08	1.60E-08
U235	7.04E+08	yr	1.00E-10	1.00E-10	1.00E-10	1.00E-10	1.00E-10
U236	2.34E+07	yr	2.40E-10	2.40E-10	2.40E-10	2.40E-10	2.40E-10
U237	6.75E+00	d	2.10E-11	8.30E-12	6.70E-14	1.20E-19	1.20E-19
U238	4.47E+09	yr	5.80E-12	5.80E-12	5.80E-12	5.80E-12	5.80E-12
U240	1.41E+01	h	2.20E-19	2.20E-19	2.20E-19	2.20E-19	2.20E-19
Np235	3.96E+02	d	2.00E-26				
Np237	2.14E+06	yr	5.00E-09	5.00E-09	5.00E-09	5.10E-09	5.10E-09
Np238	2.12E+00	d	9.10E-14	8.30E-14	5.30E-14	8.50E-15	8.70E-16
Np239	2.36E+00	d	1.90E-11	1.90E-11	1.90E-11	1.80E-11	1.70E-11
Np240m	7.40E+00	m	2.20E-19	2.20E-19	2.20E-19	2.20E-19	2.20E-19
Pu236	2.85E+00	yr	5.00E-15	4.90E-15	4.90E-15	4.90E-15	4.90E-15
Pu238	8.78E+01	yr	1.90E-06	1.60E-06	7.30E-07	3.10E-08	6.00E-10
Pu239	2.41E+04	yr	2.40E-07	2.40E-07	2.40E-07	2.40E-07	2.30E-07
Pu240	6.57E+03	yr	9.60E-08	9.60E-08	9.40E-08	9.10E-08	8.60E-08
Pu241	1.44E+01	yr	8.40E-07	3.40E-07	2.70E-09	4.90E-15	4.70E-15
Pu242	3.76E+05	yr	7.20E-12	7.20E-12	7.20E-12	7.20E-12	7.20E-12
Pu243	4.96E+00	h	4.30E-23	4.30E-23	4.30E-23	4.30E-23	4.30E-23
Pu244	8.26E+07	yr	2.20E-19	2.20E-19	2.20E-19	2.20E-19	2.20E-19
Am241	4.32E+02	yr	5.40E-07	5.40E-07	4.70E-07	2.50E-07	1.10E-07
Am242m	1.52E+02	yr	1.80E-11	1.70E-11	1.10E-11	1.70E-12	1.70E-13
Am242	1.60E+01	h	1.80E-11	1.70E-11	1.00E-11	1.70E-12	1.70E-13
Am243	7.38E+03	yr	1.90E-11	1.90E-11	1.90E-11	1.80E-11	1.70E-11
Cm242	1.63E+02	d	1.50E-11	1.40E-11	8.70E-12	1.40E-12	1.40E-13
Cm243	2.85E+01	yr	9.70E-13	6.10E-13	5.40E-14	3.20E-18	1.70E-23
Cm244	1.81E+01	yr	3.00E-11	1.40E-11	3.10E-13	7.10E-20	3.40E-28
Cm245	8.50E+03	yr	5.10E-15	5.10E-15	5.10E-15	4.90E-15	4.70E-15
Cm246	4.75E+03	yr	1.20E-16	1.20E-16	1.20E-16	1.10E-16	1.00E-16
Cm247	1.56E+07	yr	4.30E-23	4.30E-23	4.30E-23	4.30E-23	4.30E-23
Cm248	3.39E+05	yr	1.30E-23	1.30E-23	1.30E-23	1.30E-23	1.30E-23
Cf249	3.51E+02	yr	2.60E-23	2.50E-23	2.10E-23	9.40E-24	3.50E-24
Cf250	1.31E+01	yr	2.20E-24	8.10E-25	4.10E-27	2.50E-36	
Cf251	9.00E+02	yr	7.00E-26	6.90E-26	6.40E-26		
Cf252	2.64E+00	yr	5.50E-29				

Attachment 2

Analytical Log 84-021529

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                              Log Search
Date of Search: 2002-06-18 17:06:24.194              Run by: RICK ANSELMO
*************************************************************************
Search Criteria:
   Start Log.....:840101 1
   End Log.......:841231 15
   Log Approval.:ALL Logs
   Result Type..:All Entries
   Lab/Group....:ALL Groups
   Name Column..:Lab Sample ID
     Request Name..:*SFE*2*

Total # Logs Found...: 2
Total # Results Found: 41
*************************************************************************

Log #        Request Name    Log Type        Charge Num     Log Approval Info
  I                    L
  d  Lab          Meth  a Ana-
  x  ID             #   b lyst  Analyte  ARL              Result
-----------------------------------------------------------------------------

840215-29   SFE 20 AREA                       89446-221-000Unapproved by
119 #9            25920  PAG URANIUM     ... <  1.5958E-04 G/L
126 1              3993  ILD GAMMA SCAN ...   ATTACHED
127 2              3993  ILD GAMMA SCAN ...   ATTACHED
128 3              3993  LEE GAMMA SCAN ...   ATTACHED
129 4              3993  LEE GAMMA SCAN ...   ATTACHED
130 5              3993  ILD GAMMA SCAN ...   ATTACHED
131 7              3993  LEE GAMMA SCAN ...   ATTACHED
132 8              3993  ILD GAMMA SCAN ...   ATTACHED
133 9              3993  LEE GAMMA SCAN ...   ATTACHED
134 10             3993  LEE GAMMA SCAN ...   ATTACHED
135 14             3993  LEE GAMMA SCAN ...   ATTACHED
136 11             3993  ILD GAMMA SCAN ...   ATTACHED
137 12             3993  ILD GAMMA SCAN ...   ATTACHED
138 13             3993  ILD GAMMA SCAN ...   ATTACHED
139 9              5092      FLUORIDE    ...  NOT REQUESTED
140 10             5092      FLUORIDE    ...  NOT REQUESTED
141 12             5092      FLUORIDE    ...  NOT REQUESTED
142 9              3991  TVP GROSS ALPH ...   0.027 A/S/ML
143 10             3991  TVP GROSS ALPH ...   0.036 A/S/ML
144 13             3994  TLV ALPHA SCAN ...   TOO HOT FOR INSTRUMENT
145 9              3941  TVP PLUTONIUM   ...  3.78D/S/ML 38=76% 39=24%
146 10             3941  TVP PLUTONIUM   ...  6.53D/S/ML 38=90% 39=10%
147 13             3941  TVP PLUTONIUM   ...  111.4D/S/G 46%=38 54%=39
148 12             3941  TVP PLUTONIUM   ...  3.46E3 D/S/G 38=83% 39=17%
149 9             23381  TLV TOTAL SR    ... +- 6311.63+-809.643 D/SEC/ML
150 10            23381  TLV TOTAL SR    ... +- 359.661+-36.1358 D/SEC/ML
151 12            23381  TLV TOTAL SR    ... +- 173767+-14067.9 D/SEC/G
152 13            33381  TLV TOTAL SR    ... +- 21847.1+-1327.5 D/SEC/G
153 12             8000  DRT WET DEN     ...  INSUFICIENT SAMPLE
```

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Log #        Request Name    Log Type         Charge Num    Log Approval Info
  I                    L
  d  Lab           Meth  a Ana-
  x  ID             #    b lyst  Analyte  ARL              Result
------------------------------------------------------------------------------
261 #10             25920  PAG URANIUM    ... <  1.5958E-04 G/L
262 11               3994  TLV ALPHA SCAN ...   TOO HOT FOR INSTRUMENT
263 11              33381  TLV TOTAL SR   ... +- 63612.6+-3473.44 D/SEC/G
268 #12             25920  PAG URANIUM    ... +- 1.90987E-03+-4.38871E-04 G/L
269 11               3941  TVP PLUTONIUM  ...   2.93E3 D/S/G 38=92% 39=8%


840228-21    SFE-20                              89496-224-009Unapproved by
73   #1              3993  LEE GAMMA SCAN ...   ATTACHED
74   #2              3993  ILD GAMMA SCAN ...   ATTACHED
75   #3              3993  LEE GAMMA SCAN ...   ATTACHED
76   #4              3993  LEE GAMMA SCAN ...   ATTACHED
77   #5              3993  ILD GAMMA SCAN ...   ATTACHED
78   #1              3994  BRH ALPHA SCAN ...   0.019 A/S/G
79   #2              3994  BRH ALPHA SCAN ...   0.087 A/S/G
```

*********** END **********

Attachment 3

Tables 1 and 2 from WINCO-1021

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TABLE I

SFE-20 SAMPLE LOCATION AND MATERIAL

Identification Number	Location	Type of Sample
1	Pipes (exteriors) and walls (interior) in pump pit ~ midway between CPP-642 and pit floor	Smear
2	Pipes and walls in pump pit 1-2 ft from bottom	Smear
3	Walls, floor, and ceiling of access tunnel	Smear
4	Representative areas of vault walls	Smear
5	SFE-20 tank (exterior)	Smear
7	Areas of apparent seepage on walls	Smear
8	Floor - south end of vault	Liquid
9	Floor - center section	Liquid
10	SFE-20 tank interior	Liquid
11	Floor - north end of vault	Dry solids
12	Bottom 6 in. - tank interior	Sediment
13	Bottom of pump pit	Wet-solids
14	Pump pit - sump	Liquid

ENGINEERING DESIGN FILE

TABLE 2

RADIOISOTOPIC CONTENT OF SMEARS AND SAMPLES OF SFE-20 AREA
(pCi/smear pCi/gm for solids, pCi/ml for liquids, U was reported in g/L)

	Identification Number[a]	Type	^{60}Co	^{137}Cs	^{134}Cs	^{154}Eu	^{155}Eu	^{152}Eu	^{125}Sb	Sr	Pu	U g/L
	1	Smear	--b	7.68×10^2	--b	--b	--b	--b	--b	--c	--c	--c
	2	Smear	--b	8.97×10^3	--b	--b	--b	--b	--b	--c	--c	--c
	3	Smear	55.4	1.39×10^4	59.2	584	570	121	--b	--c	--c	--c
	4	Smear		2.19×10^3								
	5	Smear	1.51	5.84×10^4	98.4	1200	770	204	--b	--c	--c	--c
	7	Smear	95.1	4.16×10^4	--b	--b	--b	--b	--b	--c	--c	--c
	8	Liquid	6.83	9.05×10^2	1.35	--b	--b	--b	--b	--c	--c	--c
	9	Liquid	105	2.48×10^5	1.55	--b	--b	--b	--b	1.71×10^5	1.02×10^2	$<1.6 \times 10^{-4}$
Tank Interior	10	Liquid	74.3	2.05×10^3	7.76	--b	--b	--b	73.2	9.70×10^3	1.76×10^4	$<1.6 \times 10^{-4}$
	11	Dry Solids	2.15×10^4	8.92×10^6	1.06×10^4	1.5×10^5	1.31×10^6	4.73×10^4	--b	1.72×10^6	7.92×10^4	--c
Bottom Tank Interior	12	Wet Solids	3.27×10^5	5.64×10^7	1.62×10^6	1.38×10^5	1.27×10^5	--b	--b	4.70×10^6	9.35×10^4	1.31×10^{-3}
	13	Wet Solids	2.38×10^4	2.29×10^6	1.33×10^4	5.63×10^4	4.62×10^4	2.05×10^4	4.73×10^4	5.69×10^6	3.01×10^3	--c
	14	Liquid	--b	76	--b	--b	--b	--b	--b	--c	--c	--c

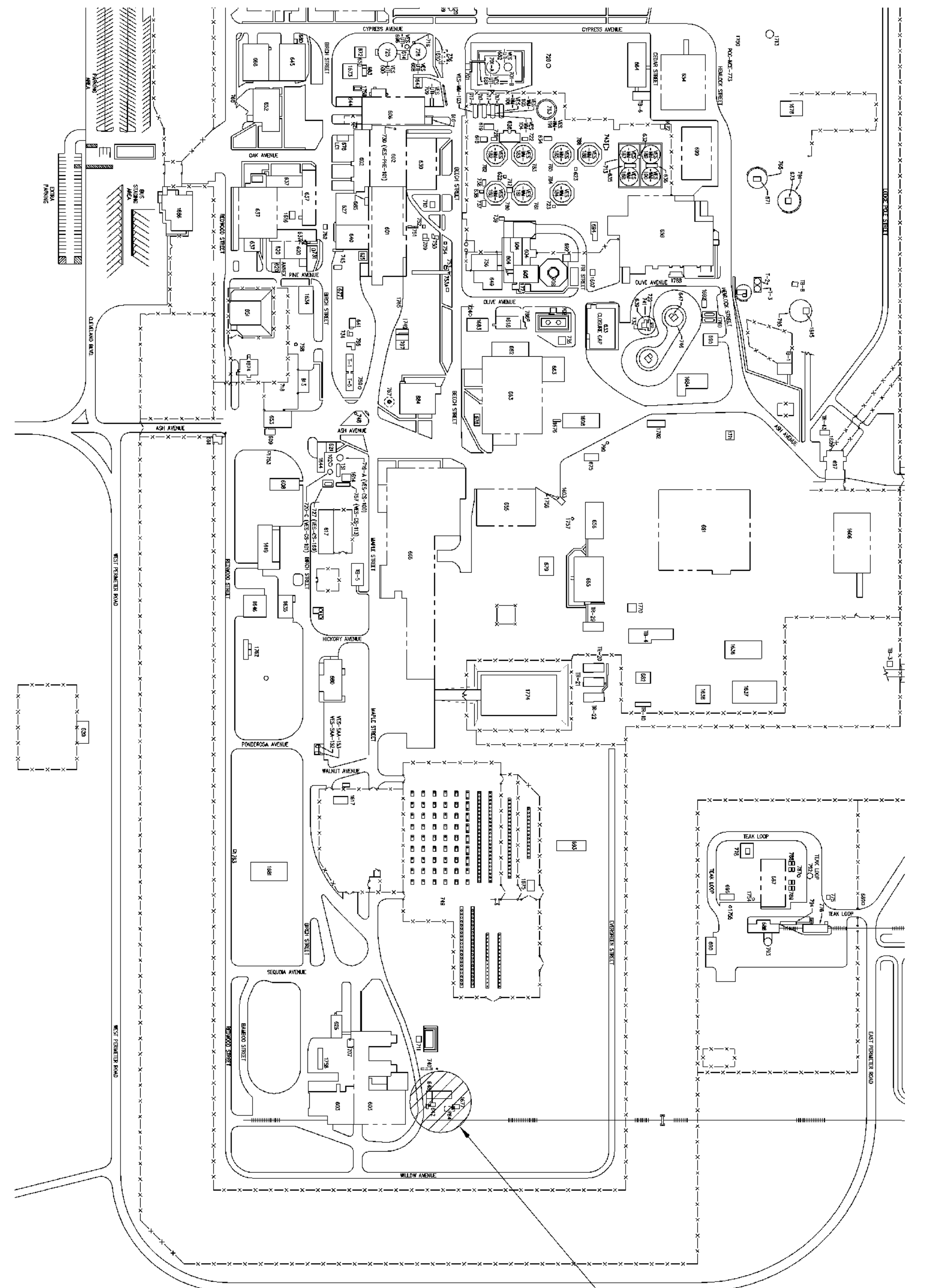
a. Table 1 lists location of each sample.

b. Isotope below detection limit.

c. Analysis was not requested. Decision was based on earlier Alpha Scan results.

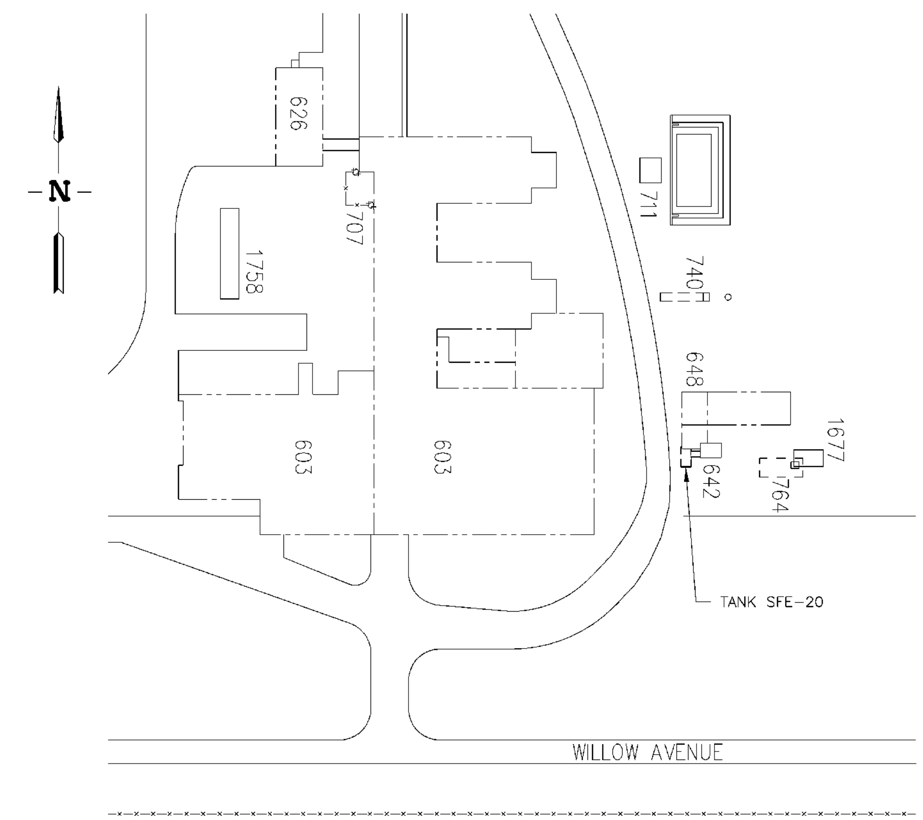
Appendix B

As-Built Drawings and Conceptual D&D&D Plans



INTEC AREA MAP

SCALE: 1"=200.0'



ENLARGED VIEW

SCALE: 1"=50.0'

DRAWING INDEX

PAGE NO.	DWG NO.	A-E DWG NO	REV	DRAWING TITLE
1		T-1		AREA MAP, ENLARGED VIEW AND DRAWING INDEX
2		U-1		UNDERGROUND UTILITIES PLAN
3		U-2		ACTIVE UTILITIES PLAN
4		D-1		DEMOLITION PLAN AND SECTIONS
5		D-2		P&ID DEMOLITION
6		D-3		VES-SFE-106 P&ID

REV	DESCRIPTION	EFFECTIVE DATE:

REVISIONS

FOR DRAWING INDEX SEE DRAWING NO. T-1

SCALE: 1" = 50.0'

SCALE: 1" = 200.0'

DESIGN PHASE: TITLE I

SAFETY CATEGORY: CG

SUBCONTRACT NO.

REQUESTER: M.S. KAPTIEN

DESIGN: KURT FRITZ

DRAWN: ROB HERGESHEIMER

PROJECT NO.

SPEC CODE

FOR REVIEW/APPROVAL SIGNATURES

SEE DAR NO.

EFFECTIVE DATE:

INEEL

INEEL

OU 3-13 GROUP 7

SFE-20 HOT WASTE TANK SYSTEM REMOVAL

AREA MAP, ENLARGED VIEW AND DRAWING INDEX

SIZE D | CAGE CODE 01MF3 | INDEX CODE NUMBER: AREA 200, TYPE 0100, GL 01, DISC 090 | DWG- | REV

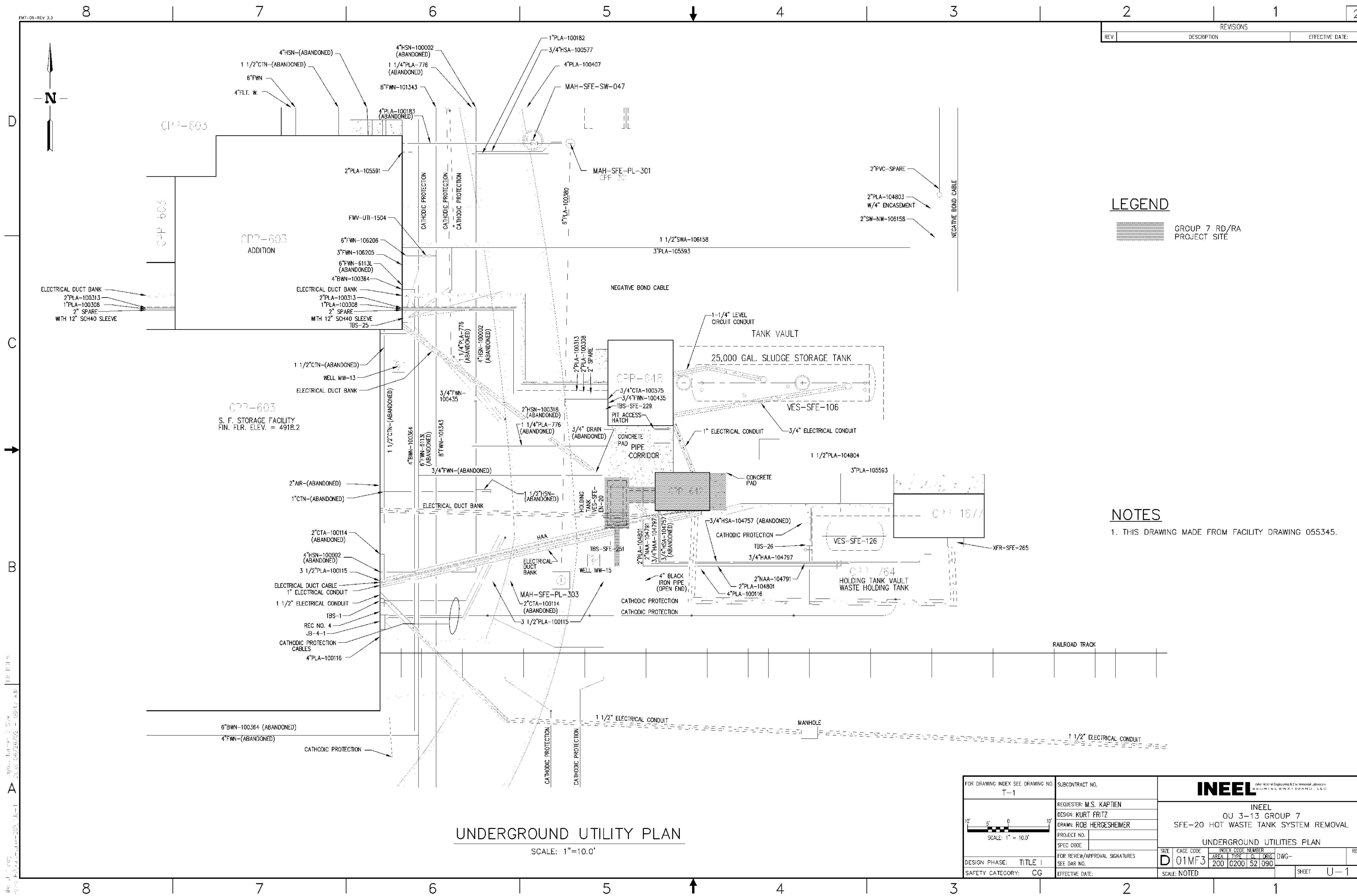
SCALE: NOTED | SHEET T-1

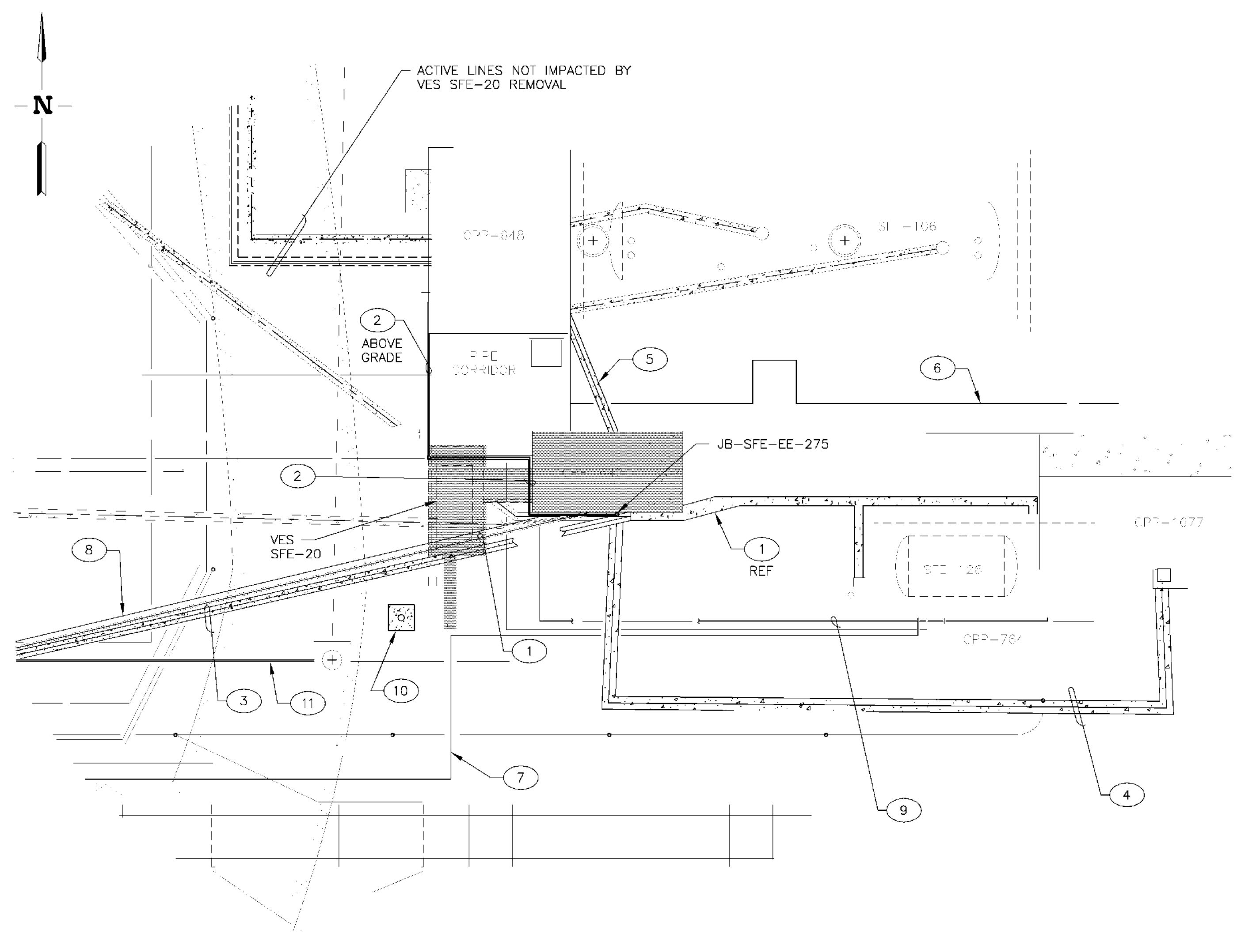
FMT-01-REV 3.3

File: T-1.dwg
Path: H:\kurt-tank-20\Title-1

Layout Name: Layout1
Date: 06/26/02 - 09:19 A.M.

ID: RDH5


UNDERGROUND UTILITY PLAN
SCALE: 1"=10.0'
LEGEND
GROUP 7 RD/RA PROJECT SITE
NOTES
1. THIS DRAWING MADE FROM FACILITY DRAWING 055345.
TANK VAULT
25,000 GAL. SLUDGE STORAGE TANK
VES-SFE-106
HOLDING TANK VAULT
WASTE HOLDING TANK
VES-SFE-126
PIPE CORRIDOR
CONCRETE PAD
S. F. STORAGE FACILITY
FIN. FLR. ELEV. = 4918.2
ADDITION
RAILROAD TRACK
MANHOLE
NEGATIVE BOND CABLE
CATHODIC PROTECTION
ELECTRICAL DUCT BANK
1 1/2" ELECTRICAL CONDUIT
MAH-SFE-SW-047
MAH-SFE-PL-301
MAH-SFE-PL-303
XFR-SFE-265
REVISIONS
REV
DESCRIPTION
EFFECTIVE DATE:
INEEL
OU 3-13 GROUP 7
SFE-20 HOT WASTE TANK SYSTEM REMOVAL
UNDERGROUND UTILITIES PLAN
FOR DRAWING INDEX SEE DRAWING NO. T-1
REQUESTER: M.S. KAPTIEN
DESIGN: KURT FRITZ
DRAWN: ROB HERGESHEIMER
DESIGN PHASE: TITLE I
SAFETY CATEGORY: CG
SCALE: NOTED
SHEET U-1
D 01MF3 200 0200 52 090



ACTIVE UTILITIES PLAN

SCALE: 1 1/2"=1'-0"

EFFECTED ACTIVE UTILITIES

1. ELECTRICAL DUCT CABLE, FROM MG-SF-129 (CPP-603) TO PLC-SFE-620 (CPP-1677) VIA JB-SFE-EE-275.
2. TWO CONDUITS (1)-1"C AND (1)-3/4"C
3. (1)-1" ELECTRICAL CONDUIT IN DUCT BANK.
4. (1)-3/4" ELECTRICAL CONDUIT.
5. (1) 1" ELECTRICAL CONDUIT IN DUCT BANK.
6. 1 1/2" PLA-104804
7. 4" PLA-100116
8. AIR LINE HAA-105541.
9. AIR LINE 3/4"HAA-104797.
10. MONITORING WELL MW-15
11. 3 1/2" PLA-100115

LEGEND

GROUP 7 RD/RA PROJECT SITE

NOTES

1. THIS SKETCH REPRESENTS UTILITIES SUPPORTING THE ACTIVE OPERATION OF VESSEL SFE-106 AND 126 THAT ARE LOCATED IN CLOSE PROXIMITY TO VESSEL SFE-20 AND CPP-648.
2. ALL ITEMS IDENTIFIED ARE BELOW GRADE UTILITIES UNLESS OTHERWISE NOTED.
3. ITEMS NOT IDENTIFIED ARE ASSUMED TO BE ABANDONED, OR OUTSIDE THE AREA IMPACTED BY VES-20 REMOVAL.

REV	DESCRIPTION	EFFECTIVE DATE:
	REVISIONS	

FOR DRAWING INDEX SEE DRAWING NO. T-1

SCALE: 1 1/2" = 1'-0"

DESIGN PHASE: TITLE I

SAFETY CATEGORY: CG

SUBCONTRACT NO.

REQUESTER: M.S. KAPTIEN

DESIGN: KURT FRITZ

DRAWN: ROB HERGESHEIMER

PROJECT NO.

SPEC CODE

FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.

EFFECTIVE DATE:

INEEL

INEEL
OU 3-13 GROUP 7
SFE-20 HOT WASTE TANK SYSTEM REMOVAL
ACTIVE UTILITIES PLAN

SIZE	CAGE CODE	AREA	TYPE	GL	DRAWING	DWG-	REV
D	01MF3	200	0200	52	090		

SCALE: NOTED — SHEET U-2 — 3

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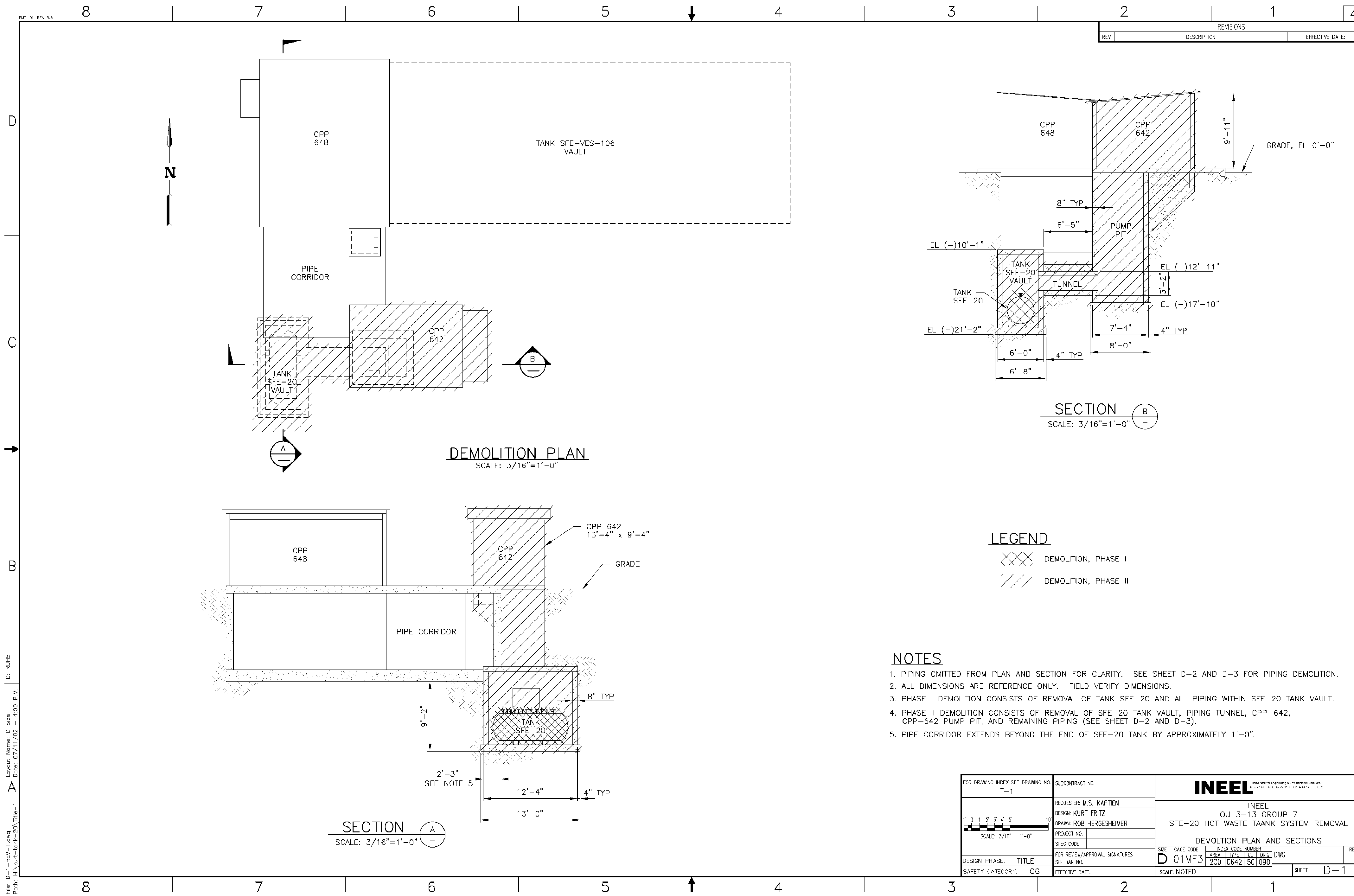
FMT-01-REV 3.3



DEMOLITION PLAN
SCALE: 3/16"=1'-0"
CPP 648
TANK SFE-VES-106 VAULT
PIPE CORRIDOR
CPP 642
TANK SFE-20 VAULT
N
SECTION A
SCALE: 3/16"=1'-0"
CPP 648
CPP 642
CPP 642 13'-4" x 9'-4"
GRADE
PIPE CORRIDOR
TANK SFE-20
8" TYP
9'-2"
2'-3" SEE NOTE 5
12'-4"
4" TYP
13'-0"
SECTION B
SCALE: 3/16"=1'-0"
CPP 648
CPP 642
9'-11"
GRADE, EL 0'-0"
8" TYP
6'-5"
PUMP PIT
EL (-)10'-1"
TANK SFE-20 VAULT
TANK SFE-20
TUNNEL
EL (-)12'-11"
3'-2"
EL (-)17'-10"
EL (-)21'-2"
7'-4"
4" TYP
8'-0"
6'-0"
4" TYP
6'-8"
LEGEND
DEMOLITION, PHASE I
DEMOLITION, PHASE II
NOTES
1. PIPING OMITTED FROM PLAN AND SECTION FOR CLARITY. SEE SHEET D-2 AND D-3 FOR PIPING DEMOLITION.
2. ALL DIMENSIONS ARE REFERENCE ONLY. FIELD VERIFY DIMENSIONS.
3. PHASE I DEMOLITION CONSISTS OF REMOVAL OF TANK SFE-20 AND ALL PIPING WITHIN SFE-20 TANK VAULT.
4. PHASE II DEMOLITION CONSISTS OF REMOVAL OF SFE-20 TANK VAULT, PIPING TUNNEL, CPP-642, CPP-642 PUMP PIT, AND REMAINING PIPING (SEE SHEET D-2 AND D-3).
5. PIPE CORRIDOR EXTENDS BEYOND THE END OF SFE-20 TANK BY APPROXIMATELY 1'-0".
REVISIONS
REV
DESCRIPTION
EFFECTIVE DATE:
4
FOR DRAWING INDEX SEE DRAWING NO. T-1
SCALE: 3/16" = 1'-0"
DESIGN PHASE: TITLE I
SAFETY CATEGORY: CG
SUBCONTRACT NO.
REQUESTER: M.S. KAPTIEN
DESIGN: KURT FRITZ
DRAWN: ROB HERGESHEIMER
PROJECT NO.
SPEC CODE
FOR REVIEW/APPROVAL SIGNATURES
SEE DAR NO.
EFFECTIVE DATE:
INEEL
INEEL
OU 3-13 GROUP 7
SFE-20 HOT WASTE TAANK SYSTEM REMOVAL
DEMOLTION PLAN AND SECTIONS
SIZE D
CAGE CODE 01MF3
INDEX CODE NUMBER
AREA 200
TYPE 0642
EL 50
DISC 090
DWG-
REV
SCALE: NOTED
SHEET D-1
FMT-01-REV 3.3
File: D-1-REV-1.dwg
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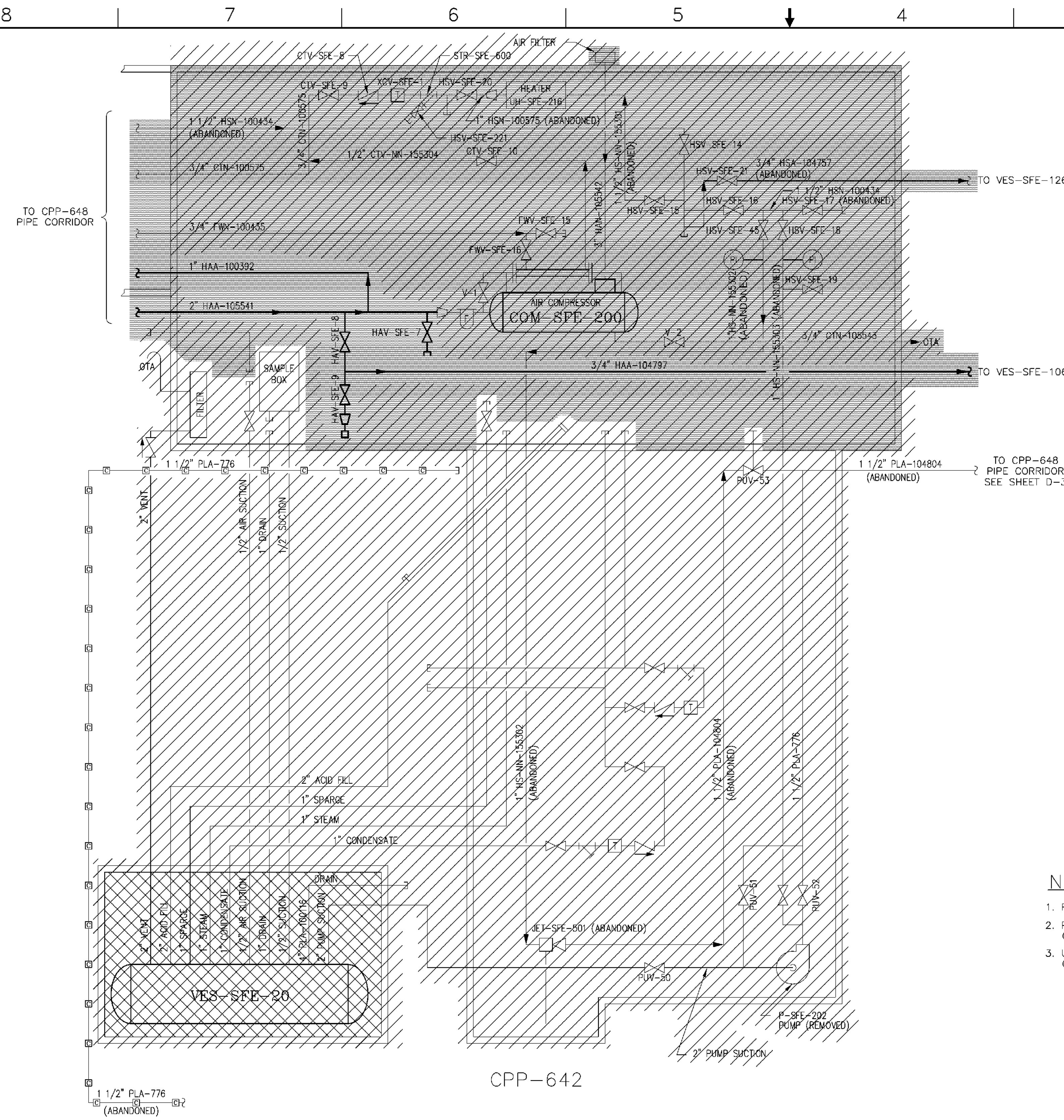
ID: RDH5



LEGEND

- DEMOLITION, PHASE I
- DEMOLITION, PHASE II
- ACTIVE LINE SUPPORTING VES-SFE-106/126 (TO BE RELOCATED)
- RCRA CLOSURE (NOT COVERED UNDER GROUP 7)
- ANCILLARY SCOPE NECESSARY TO SUPPORT THE GROUP 7 RD/RA SEE NOTE 3

NOTES

1. PHASE I DEMOLITION CONSISTS OF REMOVAL OF TANK SFE-20 AND ALL PIPING WITHIN SFE-20 TANK VAULT.
2. PHASE II DEMOLITION CONSISTS OF REMOVAL OF SFE-20 TANK VAULT, PIPING TUNNEL, CPP-642, CPP-642 PUMP PIT, AND REMAINING PIPING.
3. UNSHADED HATCHED AREAS ARE FOR THE FFA/CO SITE CPP-69 SCOPE COVERED BY GROUP 7 OF THE OU 3-13 ROD.

REV	DESCRIPTION	EFFECTIVE DATE:
	REVISIONS	

FOR DRAWING INDEX SEE DRAWING NO. T-1	SUBCONTRACT NO.	INEEL
NO SCALE	REQUESTER: M.S. KAPTIEN	INEEL OU 3-13 GROUP 7 SFE-20 HOT WASTE TANK SYSTEM REMOVAL P&ID DEMOLITION
	DESIGN: KURT FRITZ	
	DRAWN: ROB HERGESHEIMER	
	PROJECT NO.	
	SPEC CODE	
DESIGN PHASE: TITLE I	FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.	SIZE D; CAGE CODE 01MF3; INDEX CODE NUMBER: AREA 200, TYPE 0200, GL 24, DRG 090; DWG-; REV
SAFETY CATEGORY: CG	EFFECTIVE DATE:	SCALE: NONE; SHEET D-2

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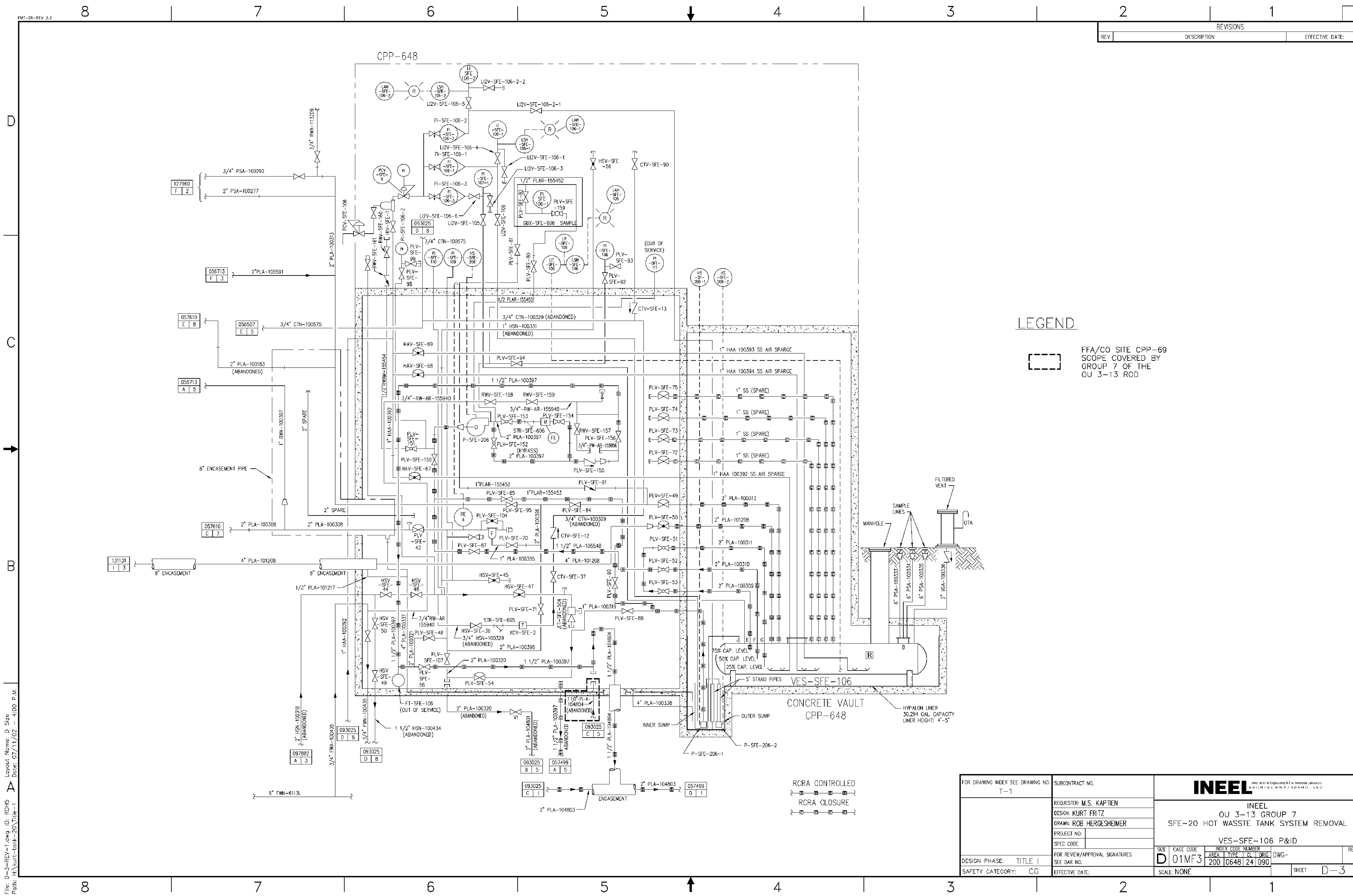
ID: RDH5

FMT-01-REV 3.3



LEGEND
FFA/CO SITE CPP-69 SCOPE COVERED BY GROUP 7 OF THE OU 3-13 ROD
RCRA CONTROLLED
RCRA CLOSURE
CONCRETE VAULT CPP-648
VES-SFE-106
CPP-648
REVISIONS
INEEL
OU 3-13 GROUP 7
SFE-20 HOT WASSTE TANK SYSTEM REMOVAL
VES-SFE-106 P&ID
REQUESTER: M.S. KAPTIEN
DESIGN: KURT FRITZ
DRAWN: ROB HERGESHEIMER
DESIGN PHASE: TITLE I
SAFETY CATEGORY: CG
SCALE: NONE
SHEET D-3

Appendix C

Cost Estimate Data

Phase One Costs

Project Summary Report

Project Name: ***WAG 3SFE-20 Hot Waste Tank Removal Phase I***

Project Location: ***INTEC***
Estimate Number: ***2977-E***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Level	Group	Description	Estimate Subtotal	Escalation	Contingency	Contingency %	TOTAL
9000		CONSTRUCTION	$527,977	$40,601	$170,574	30.00%	$739,152
9100		**--CONSTRUCTION SUBCONTRACTS**	**$398,516**	**$30,646**	**$128,749**	**30.00%**	**$557,911**
9101		**---GENERAL CONDITIONS**	**$80,027**	**$6,154**	**$25,854**	**30.00%**	**$112,036**
9101.1		------GENERAL CONDITIONS	$56,040	$4,310	$18,105	30.00%	$78,455
9101.2		------CONDUCT OF OPERATIONS/CONDUCT OF MAINTENANCE	$23,987	$1,845	$7,749	30.00%	$33,581
9102		**---SITEWORK**	**$318,489**	**$24,492**	**$102,894**	**30.00%**	**$445,876**
9102.01		-----STEP 1 ACCESS VAULT	$105,609	$8,121	$34,119	30.00%	$147,849
9102.01.01		--------Set Soldier Piles	$26,346	$2,026	$8,511	30.00%	$36,883
9102.01.02		--------Ex to Top of Vault & Set Lagging	$39,177	$3,013	$12,657	30.00%	$54,847
9102.01.03		--------Erect Entry Tent	$19,015	$1,462	$6,143	30.00%	$26,621
9102.01.04		--------Cut Vault Access	$21,071	$1,620	$6,807	30.00%	$29,498
9102.02		-----STEP 2 GROUT TANK	$34,864	$2,681	$11,263	30.00%	$48,808
9102.02.01		--------Mix & Place Grout	$34,864	$2,681	$11,263	30.00%	$48,808
9102.03		-----STEP 3 REMOVE VAULT ROOF	$96,903	$7,452	$31,306	30.00%	$135,661
9102.03.01		--------Erect DemoTent	$10,526	$809	$3,401	30.00%	$14,736
9102.03.02		--------Remove Vault Lid	$34,774	$2,674	$11,234	30.00%	$48,682
9102.03.03		--------Demo Vault Lid	$34,774	$2,674	$11,234	30.00%	$48,682
9102.03.04		--------Remove Piping	$16,829	$1,294	$5,437	30.00%	$23,560
9102.04		-----STEP 4 REMOVE TANK	$19,290	$1,483	$6,232	30.00%	$27,005
9102.04.01		--------Remove Tank	$19,290	$1,483	$6,232	30.00%	$27,005
9102.05		-----STEP 5 CLEAN VAULT	$13,555	$1,042	$4,379	30.00%	$18,977
9102.05.01		--------Clean Vault and Fix Contamination	$13,555	$1,042	$4,379	30.00%	$18,977
9102.06		-----STEP 6 GROUT BOX WITH TANK INSIDE	$19,380	$1,490	$6,261	30.00%	$27,132
9102.06.01		--------Mix and Place Grout	$19,380	$1,490	$6,261	30.00%	$27,132
9102.07		-----STEP 7 REMOVE TENT AND FILL HOLE	$28,888	$2,222	$9,333	30.00%	$40,443
9102.07.01		--------Remove Access and Demo Tent	$8,150	$627	$2,633	30.00%	$11,409

Project Summary Report

Project Name: ***WAG 3SFE-20 Hot Waste Tank Removal Phase I***

Project Location: ***INTEC***
Estimate Number: ***2977-E***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Level	Group	Description	Estimate Subtotal	Escalation	Contingency	Contingency %	TOTAL
9102.07.02		--------Install Temp Lid	$11,597	$892	$3,747	30.00%	$16,235
9102.07.03		--------Cover Vault With Dirt	$9,142	$703	$2,954	30.00%	$12,799
9300		**--CONSTRUCTION SUPPORT**	**$129,461**	**$9,956**	**$41,825**	**30.00%**	**$181,241**
9310		**---CONSTRUCTION SUPPORT - RADTECH**	**$75,059**	**$5,772**	**$24,249**	**30.00%**	**$105,081**
9320		**---CONSTRUCTION SUPPORT - ES&H**	**$49,152**	**$3,780**	**$15,879**	**30.00%**	**$68,811**
9330		**---CONSTRUCTION SUPPORT - OTHER**	**$5,250**	**$404**	**$1,696**	**30.00%**	**$7,350**
Total	Phase 1		$527,977	$40,601	$170,574	30.00%	$739,152

DETAIL ITEM REPORT

Project Name: ***WAG 3SFE-20 Hot Waste Tank Removal Phase I***

Project Location: ***INTEC***
Estimate Number: ***2977-E***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Code Description	Contractor		Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
9101.1 GENERAL CONDITIONS											
	GEN	U.C. per Wk		40	CN-SUPR	1600	0	0	0	0	1600
Supervision			18.00	720	$40.00	$28,800	$0	$0	$0	$0	$28,800
	GEN	U.C. per Men		40	CN-LABR	1263.2	0	0	0	0	1263.2
Training			10.00	400	$31.58	$12,632	$0	$0	$0	$0	$12,632
	GEN	U.C. per Lot			CN-LABR	0	2000	0	0	0	2000
Drill Mobilization & Demobilization			1.00	0		$0	$2,000	$0	$0	$0	$2,000
Subtotal						$41,432	$2,000	$0	$0	$0	$43,432
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$12,028	$581	$0	$0	$0	$12,608
Subtotal Estimate											**$56,040**
Escalation						$4,111	$198	$0	$0	$0	$4,309
Contingency						$17,271	$834	$0	$0	$0	$18,105
---Total 9101.1 GENERAL CONDITIONS				**1,120**		**$74,842**	**$3,613**	**$0**	**$0**	**$0**	**$78,455**
9101.2 CONDUCT OF OPERATIONS/CONDUCT OF MAINTENANCE											
	GEN	U.C. per Wks		32	CN-LABR	1010.56	0	0	0	0	1010.56
WORKABILITY WALKDOWN - 1 HR/DAY X 8 WORKERS X 4 DAY/WK			18.00	576	$31.58	$18,190	$0	$0	$0	$0	$18,190
	GEN	U.C. per LOT		10	CN-SUPR	400	0	0	0	0	400
POST JOB REVIEW			1.00	10	$40.00	$400	$0	$0	$0	$0	$400
Subtotal						$18,590	$0	$0	$0	$0	$18,590
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$5,397	$0	$0	$0	$0	$5,397
Subtotal Estimate											**$23,987**
Escalation						$1,845	$0	$0	$0	$0	$1,845
Contingency						$7,749	$0	$0	$0	$0	$7,749
---Total 9101.2 CONDUCT OF OPERATIONS/CONDUCT OF MAINTENANCE				**586**		**$33,581**	**$0**	**$0**	**$0**	**$0**	**$33,581**
9102.01.01 Set Soldier Piles											
	SPEC	U.C. per				0	0	0.01	0	0	0.01
***Drill 6 Holes x 30' Deep			6.00	0		$0	$0	$0	$0	$0	$0
00E0830	SPEC	U.C. per hr		1	00E0830	0	132.73	0	0	0	132.73
Robins RRT35 Drill			40.00	40		$0	$5,309	$0	$0	$0	$5,309
CN-EQHV	SPEC	U.C. per hr		1	CN-EQHV	35.49	0	0	0	0	35.49
Equipment Operators, Crane Or Shovel			40.00	40	$35.49	$1,420	$0	$0	$0	$0	$1,420
CN-EQOL	SPEC	U.C. per hr		1	CN-EQOL	34.2	0	0	0	0	34.2
Equipment Operators, Oilers			40.00	40	$34.20	$1,368	$0	$0	$0	$0	$1,368

DETAIL ITEM REPORT

Project Name: ***WAG 3SFE-20 Hot Waste Tank Removal Phase I***

Project Location: ***INTEC***
Estimate Number: ***2977-E***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Code Description	Contractor		Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
9102.01.01 Set Soldier Piles											
***Set 8 x 58 Piles	SPEC	U.C. per ea	6.00	0		0 $0	0 $0	0.01 $0	0 $0	0 $0	0.01 $0
Purchase Piles	SPEC	U.C. per lb	10,500.00	0		0 $0	0 $0	0.45 $4,725	0 $0	0 $0	0.45 $4,725
00E1310 Grove RT522 20 tn Crane		U.C. per hr	40.00	1 40	00E1310	0 $0	68.68 $2,747	0 $0	0 $0	0 $0	68.68 $2,747
CN-EQHV Equipment Operators, Crane Or Shovel		U.C. per hr	40.00	1 40	CN-EQHV $35.49	35.49 $1,420	0 $0	0 $0	0 $0	0 $0	35.49 $1,420
CN-PILE Pile Drivers		U.C. per hr	40.00	2 80	CN-PILE $35.49	70.98 $2,839	0 $0	0 $0	0 $0	0 $0	70.98 $2,839
Subtotal						$7,046	$8,056	$4,725	$0	$0	$19,828
Sales Tax						$0	$0	$236	$0	$0	$236
INEEL/Subcontractor Overheads		31.31%				$1,341	$2,554	$2,387	$0	$0	$6,282
Subtotal Estimate											**$26,346**
Escalation						$645	$816	$565	$0	$0	$2,026
Contingency						$2,710	$3,428	$2,374	$0	$0	$8,511
---Total 9102.01.01 Set Soldier Piles				**200**		**$11,742**	**$14,854**	**$10,287**	**$0**	**$0**	**$36,883**
9102.01.02 Ex to Top of Vault & Set Lagging											
CN-EQMD Ex Vault W/Hoe	EARTH	U.C. per hr	120.00	1 120	CN-EQMD $34.75	34.75 $4,170	53.64 $6,437	0 $0	0 $0	0 $0	88.39 $10,607
CN-EQMD Ex Vault W/Labors	EARTH	U.C. per hr	120.00	4 480	CN-LABR $31.58	126.32 $15,158	0 $0	0 $0	0 $0	0 $0	126.32 $15,158
Purchase Lagging	EARTH	U.C. per mbf	2.50	0		0 $0	0 $0	700 $1,750	0 $0	0 $0	700 $1,750
Subtotal						$19,328	$6,437	$1,750	$0	$0	$27,515
Sales Tax						$0	$0	$88	$0	$0	$88
INEEL/Subcontractor Overheads		41.93%				$8,105	$2,699	$771	$0	$0	$11,575
Subtotal Estimate											**$39,177**
Escalation						$2,110	$703	$201	$0	$0	$3,013
Contingency						$8,863	$2,952	$843	$0	$0	$12,657
---Total 9102.01.02 Ex to Top of Vault & Set Lagging				**600**		**$38,406**	**$12,790**	**$3,651**	**$0**	**$0**	**$54,847**
9102.01.03 Erect Entry Tent											
Erect Tent	GEN	U.C. per ea	1.00	150 150	CN-LABR $31.58	4737 $4,737	10000 $10,000	0 $0	0 $0	0 $0	14737 $14,737

DETAIL ITEM REPORT

Project Name: ***WAG 3SFE-20 Hot Waste Tank Removal Phase I***

Project Location: ***INTEC***
Estimate Number: ***2977-E***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Code Description	Contractor		Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
9102.01.03 Erect Entry Tent											
Subtotal						$4,737	$10,000	$0	$0	$0	$14,737
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$1,375	$2,903	$0	$0	$0	$4,278
Subtotal Estimate											**$19,015**
Escalation						$470	$992	$0	$0	$0	$1,462
Contingency						$1,975	$4,169	$0	$0	$0	$6,143
---Total 9102.01.03 Erect Entry Tent				**150**		**$8,557**	**$18,064**	**$0**	**$0**	**$0**	**$26,621**
9102.01.04 Cut Vault Access											
	GEN	U.C. per day				0	0	0	2000	0	2000
Saw Cut Vault Access			8.00	0		$0	$0	$0	$16,000	$0	$16,000
CN-EQMD	EARTH	U.C. per cf				0	0	0	5	0	5
Box Contaminated Concrete			60.00	0		$0	$0	$0	$300	$0	$300
Subtotal						$0	$0	$0	$16,300	$0	$16,300
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.27%				$0	$0	$0	$4,771	$0	$4,771
Subtotal Estimate											**$21,071**
Escalation						$0	$0	$0	$1,620	$0	$1,620
Contingency						$0	$0	$0	$6,807	$0	$6,807
---Total 9102.01.04 Cut Vault Access				**0**		**$0**	**$0**	**$0**	**$29,498**	**$0**	**$29,498**
9102.02.01 Mix & Place Grout											
	GEN	U.C. per day				0	0	0	3000	0	3000
Gravity Grout HIC (Labor)			8.00	0		$0	$0	$0	$24,000	$0	$24,000
	GEN	U.C. per cf				0	0	30	0	0	30
Gravity Grout HIC (Grout)			80.00	0		$0	$0	$2,400	$0	$0	$2,400
	GEN	U.C. per lot				0	500	0	0	0	500
Misc Equipment/Material			1.00	0		$0	$500	$0	$0	$0	$500
Subtotal						$0	$500	$2,400	$24,000	$0	$26,900
Sales Tax						$0	$0	$120	$0	$0	$120
INEEL/Subcontractor Overheads		29.03%				$0	$145	$732	$6,967	$0	$7,844
Subtotal Estimate											**$34,864**
Escalation						$0	$50	$250	$2,381	$0	$2,681
Contingency						$0	$208	$1,050	$10,005	$0	$11,263
---Total 9102.02.01 Mix & Place Grout				**0**		**$0**	**$903**	**$4,552**	**$43,353**	**$0**	**$48,808**

DETAIL ITEM REPORT

Project Name: ***WAG 3SFE-20 Hot Waste Tank Removal Phase I***

Project Location: ***INTEC***
Estimate Number: ***2977-E***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Code Description	Contractor		Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
9102.03.01 Erect DemoTent											
	GEN	U.C. per ea		100	CN-LABR	3158	5000	0	0	0	8158
Erect Tent			1.00	100	$31.58	$3,158	$5,000	$0	$0	$0	$8,158
Subtotal						$3,158	$5,000	$0	$0	$0	$8,158
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$917	$1,452	$0	$0	$0	$2,368
Subtotal Estimate											**$10,526**
Escalation						$313	$496	$0	$0	$0	$809
Contingency						$1,316	$2,084	$0	$0	$0	$3,401
---Total 9102.03.01 Erect DemoTent				**100**		**$5,705**	**$9,032**	**$0**	**$0**	**$0**	**$14,736**
9102.03.02 Remove Vault Lid											
	GEN	U.C. per day				0	0	0	2000	0	2000
Saw Cut Vault Lid			6.00	0		$0	$0	$0	$12,000	$0	$12,000
	GEN	U.C. per hr		1	CN-EQMD	34.75	165	0	0	0	199.75
Crane For Lift (Vault Lid)			40.00	40	$34.75	$1,390	$6,600	$0	$0	$0	$7,990
	GEN	U.C. per hr		4	CN-IRON	174	0	0	0	0	174
Labor for Lift (Vault Lid)			40.00	160	$43.50	$6,960	$0	$0	$0	$0	$6,960
Subtotal						$8,350	$6,600	$0	$12,000	$0	$26,950
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$2,424	$1,916	$0	$3,484	$0	$7,824
Subtotal Estimate											**$34,774**
Escalation						$829	$655	$0	$1,191	$0	$2,674
Contingency						$3,481	$2,751	$0	$5,002	$0	$11,234
---Total 9102.03.02 Remove Vault Lid				**200**		**$15,083**	**$11,922**	**$0**	**$21,677**	**$0**	**$48,682**
9102.03.03 Demo Vault Lid											
	GEN	U.C. per day				0	0	0	2000	0	2000
Saw Cut Vault Lid			6.00	0		$0	$0	$0	$12,000	$0	$12,000
	GEN	U.C. per hr		1	CN-EQMD	34.75	165	0	0	0	199.75
Crane For Lift (Vault Lid)			40.00	40	$34.75	$1,390	$6,600	$0	$0	$0	$7,990

Code Description	Contractor		Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
9102.03.03 Demo Vault Lid											
	GEN	U.C. per hr		4	CN-IRON	174	0	0	0	0	174
Labor for Lift (Vault Lid)			40.00	160	$43.50	$6,960	$0	$0	$0	$0	$6,960
Subtotal						$8,350	$6,600	$0	$12,000	$0	$26,950
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$2,424	$1,916	$0	$3,484	$0	$7,824
Subtotal Estimate											**$34,774**
Escalation						$829	$655	$0	$1,191	$0	$2,674
Contingency						$3,481	$2,751	$0	$5,002	$0	$11,234
---Total 9102.03.03 Demo Vault Lid				**200**		**$15,083**	**$11,922**	**$0**	**$21,677**	**$0**	**$48,682**
9102.03.04 Remove Piping											
	GEN	U.C. per hr		1	CN-EQMD	34.75	165	0	0	0	199.75
Crane to Lift (Pipe)			40.00	40	$34.75	$1,390	$6,600	$0	$0	$0	$7,990
	GEN	U.C. per hr		4	CN-LABR	126.32	0	0	0	0	126.32
Labor to Remove (Pipe)			40.00	160	$31.58	$5,053	$0	$0	$0	$0	$5,053
Subtotal						$6,443	$6,600	$0	$0	$0	$13,043
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$1,870	$1,916	$0	$0	$0	$3,786
Subtotal Estimate											**$16,829**
Escalation						$639	$655	$0	$0	$0	$1,294
Contingency						$2,686	$2,751	$0	$0	$0	$5,437
---Total 9102.03.04 Remove Piping				**200**		**$11,638**	**$11,922**	**$0**	**$0**	**$0**	**$23,560**
9102.04.01 Remove Tank											
	GEN	U.C. per hr		1	CN-EQMD	34.75	165	0	0	0	199.75
Crane For Lift (Tank)			40.00	40	$34.75	$1,390	$6,600	$0	$0	$0	$7,990
	GEN	U.C. per hr		4	CN-IRON	174	0	0	0	0	174
Labor for Lift (Tank)			40.00	160	$43.50	$6,960	$0	$0	$0	$0	$6,960
Subtotal						$8,350	$6,600	$0	$0	$0	$14,950
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$2,424	$1,916	$0	$0	$0	$4,340
Subtotal Estimate											**$19,290**
Escalation						$829	$655	$0	$0	$0	$1,483
Contingency						$3,481	$2,751	$0	$0	$0	$6,232
---Total 9102.04.01 Remove Tank				**200**		**$15,083**	**$11,922**	**$0**	**$0**	**$0**	**$27,005**

DETAIL ITEM REPORT

Project Name: ***WAG 3SFE-20 Hot Waste Tank Removal Phase I***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Project Location: ***INTEC***
Estimate Number: ***2977-E***

Code Description	Contractor		Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
9102.05.01 Clean Vault and Fix Contamination											
	GEN	U.C. per day		40	CN-LABR	1263.2	50	0	0	0	1313.2
Clean Vault			8.00	320	$31.58	$10,106	$400	$0	$0	$0	$10,506
Subtotal						$10,106	$400	$0	$0	$0	$10,506
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$2,934	$116	$0	$0	$0	$3,050
Subtotal Estimate											**$13,555**
Escalation						$1,003	$40	$0	$0	$0	$1,042
Contingency						$4,213	$167	$0	$0	$0	$4,379
---Total 9102.05.01 Clean Vault and Fix Contamination				**320**		**$18,255**	**$723**	**$0**	**$0**	**$0**	**$18,977**
9102.06.01 Mix and Place Grout											
	GEN	U.C. per day				0	0	0	3000	0	3000
Gravity Grout Waste Box (Labor)			4.00	0		$0	$0	$0	$12,000	$0	$12,000
	GEN	U.C. per cf				0	0	30	0	0	30
Gravity GroutWaste Box (Grout)			80.00	0		$0	$0	$2,400	$0	$0	$2,400
	GEN	U.C. per lot				0	500	0	0	0	500
Misc Equipment/Material			1.00	0		$0	$500	$0	$0	$0	$500
Subtotal						$0	$500	$2,400	$12,000	$0	$14,900
Sales Tax						$0	$0	$120	$0	$0	$120
INEEL/Subcontractor Overheads		29.03%				$0	$145	$732	$3,484	$0	$4,360
Subtotal Estimate											**$19,380**
Escalation						$0	$50	$250	$1,191	$0	$1,490
Contingency						$0	$208	$1,050	$5,002	$0	$6,261
---Total 9102.06.01 Mix and Place Grout				**0**		**$0**	**$903**	**$4,552**	**$21,677**	**$0**	**$27,132**
9102.07.01 Remove Access and Demo Tent											
	GEN	U.C. per ea		100	CN-LABR	3158	0	0	0	0	3158
Demo Tent			2.00	200	$31.58	$6,316	$0	$0	$0	$0	$6,316
Subtotal						$6,316	$0	$0	$0	$0	$6,316
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$1,834	$0	$0	$0	$0	$1,834
Subtotal Estimate											**$8,150**
Escalation						$627	$0	$0	$0	$0	$627
Contingency						$2,633	$0	$0	$0	$0	$2,633
---Total 9102.07.01 Remove Access and Demo Tent				**200**		**$11,409**	**$0**	**$0**	**$0**	**$0**	**$11,409**

DETAIL ITEM REPORT

Project Name: ***WAG 3SFE-20 Hot Waste Tank Removal Phase I***

Project Location: ***INTEC***
Estimate Number: ***2977-E***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Code Description	Contractor		Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
9102.07.02 Install Temp Lid											
	GEN	U.C. per hr		1	CN-EQMD	34.75	165	0	0	0	199.75
Crane For Lift (Vault Lid)			10.00	10	$34.75	$348	$1,650	$0	$0	$0	$1,998
	GEN	U.C. per hr		4	CN-IRON	174	0	0	0	0	174
Labor for Lift (Vault Lid)			10.00	40	$43.50	$1,740	$0	$0	$0	$0	$1,740
	GEN	U.C. per ea				0	0	5000	0	0	5000
Purchase Lid			1.00	0		$0	$0	$5,000	$0	$0	$5,000
Subtotal						$2,088	$1,650	$5,000	$0	$0	$8,738
Sales Tax						$0	$0	$250	$0	$0	$250
INEEL/Subcontractor Overheads		29.03%				$606	$479	$1,524	$0	$0	$2,609
Subtotal Estimate											**$11,597**
Escalation						$207	$164	$521	$0	$0	$892
Contingency						$870	$688	$2,189	$0	$0	$3,747
---Total 9102.07.02 Install Temp Lid				**50**		**$3,771**	**$2,981**	**$9,484**	**$0**	**$0**	**$16,235**
9102.07.03 Cover Vault With Dirt											
CN-EQMD	EARTH	U.C. per hr		1	CN-EQMD	34.75	53.64	0	0	0	88.39
Backfill Vault (FEL)			30.00	30	$34.75	$1,043	$1,609	$0	$0	$0	$2,652
CN-EQMD	EARTH	U.C. per hr		4	CN-LABR	126.32	0	0	0	0	126.32
Backfill Vault (Labors)			30.00	120	$31.58	$3,790	$0	$0	$0	$0	$3,790
Subtotal						$4,832	$1,609	$0	$0	$0	$6,441
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		41.93%				$2,026	$675	$0	$0	$0	$2,701
Subtotal Estimate											**$9,142**
Escalation						$527	$176	$0	$0	$0	$703
Contingency						$2,216	$738	$0	$0	$0	$2,954
---Total 9102.07.03 Cover Vault With Dirt				**150**		**$9,601**	**$3,198**	**$0**	**$0**	**$0**	**$12,799**
9310 CONSTRUCTION SUPPORT - RADTECH											
U60760		U.C. per wks		80	U60760	4169.951	0	0	0	0	4169.951
RADIOLOGICAL CONTROL TECH			18.00	1,440	$52.12	$75,059	$0	$0	$0	$0	$75,059

DETAIL ITEM REPORT

Project Name: *WAG 3SFE-20 Hot Waste Tank Removal Phase I*

Project Location: ***INTEC***
Estimate Number: ***2977-E***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Code Description	Contractor	Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
9310 CONSTRUCTION SUPPORT - RADTECH										
Subtotal					$75,059	$0	$0	$0	$0	$75,059
Sales Tax					$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads	0.00%				$0	$0	$0	$0	$0	$0
Subtotal Estimate										**$75,059**
Escalation					$5,772	$0	$0	$0	$0	$5,772
Contingency					$24,249	$0	$0	$0	$0	$24,249
---Total 9310 CONSTRUCTION SUPPORT - RADTECH			**1,440**		**$105,081**	**$0**	**$0**	**$0**	**$0**	**$105,081**
9320 CONSTRUCTION SUPPORT - ES&H										
S0871A	U.C. per wks		40	S0871A	2730.64	0	0	0	0	2730.64
INDUSTRIAL HYGIENE		18.00	720	$68.27	$49,152	$0	$0	$0	$0	$49,152
Subtotal					$49,152	$0	$0	$0	$0	$49,152
Sales Tax					$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads	0.00%				$0	$0	$0	$0	$0	$0
Subtotal Estimate										**$49,152**
Escalation					$3,780	$0	$0	$0	$0	$3,780
Contingency					$15,879	$0	$0	$0	$0	$15,879
---Total 9320 CONSTRUCTION SUPPORT - ES&H			**720**		**$68,811**	**$0**	**$0**	**$0**	**$0**	**$68,811**
9330 CONSTRUCTION SUPPORT - OTHER										
	U.C. per				0	0	500	0	0	500
RAD Boxes		10.00	0		$0	$0	$5,000	$0	$0	$5,000
Subtotal					$0	$0	$5,000	$0	$0	$5,000
Sales Tax					$0	$0	$250	$0	$0	$250
INEEL/Subcontractor Overheads	0.00%				$0	$0	$0	$0	$0	$0
Subtotal Estimate										**$5,250**
Escalation					$0	$0	$404	$0	$0	$404
Contingency					$0	$0	$1,696	$0	$0	$1,696
---Total 9330 CONSTRUCTION SUPPORT - OTHER			**0**		**$0**	**$0**	**$7,350**	**$0**	**$0**	**$7,350**

DETAIL ITEM REPORT

Project Name: ***WAG 3SFE-20 Hot Waste Tank Removal Phase I***

Project Location: ***INTEC***
Estimate Number: ***2977-E***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Code	Description	Contractor	Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
	Subtotal Phase 1					$273,337	$62,552	$21,275	$76,300	$0	$433,464
	Sales Tax					$0	$0	$1,064	$0	$0	$1,064
	INEEL/Subcontractor Overheads					$45,704	$19,412	$6,144	$22,189	$0	$93,449
	Subtotal Estimate										$527,977
	Escalation					$24,534	$6,303	$2,190	$7,574	$0	$40,601
	Contingency					$103,072	$26,480	$9,202	$31,819	$0	$170,574
	Total Phase 1			6,436		$446,647	$114,748	$39,876	$137,881	$0	$739,152

Phase Two Costs

Project Summary Report

Project Name: ***WAG 3SFE-20 Hot Waste Tank Removal Phase II***

Project Location: ***INTEC***
Estimate Number: ***2977-E2***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Level	Group	Description	Estimate Subtotal	Escalation	Contingency	Contingency %	TOTAL
9000		CONSTRUCTION	$1,429,736	$109,947	$461,905	30.00%	$2,001,587
9100		**--CONSTRUCTION SUBCONTRACTS**	**$1,222,773**	**$94,031**	**$395,041**	**30.00%**	**$1,711,845**
9101		**----GENERAL CONDITIONS**	**$106,078**	**$8,157**	**$34,271**	**30.00%**	**$148,506**
9101.1		-----GENERAL CONDITIONS	$74,268	$5,711	$23,994	30.00%	$103,972
9101.2		------CONDUCT OF OPERATIONS/CONDUCT OF MAINTENANCE	$31,810	$2,446	$10,277	30.00%	$44,534
9102		**----SITEWORK**	**$1,116,695**	**$85,874**	**$360,771**	**30.00%**	**$1,563,340**
9102.01		------STEP 1 DEMO CPP 642	$47,427	$3,647	$15,322	30.00%	$66,397
9102.01.01		--------Demo Building and Slab	$47,427	$3,647	$15,322	30.00%	$66,397
9102.02		------STEP 2 EXCAVATION	$159,573	$12,271	$51,553	30.00%	$223,397
9102.02.01		--------Set Soldier Piles	$70,466	$5,419	$22,766	30.00%	$98,651
9102.02.02		--------Ex and Set Lagging	$47,001	$3,614	$15,185	30.00%	$65,801
9102.02.03		--------Erect DemoTent	$10,526	$809	$3,401	30.00%	$14,736
9102.02.04		--------Erect EntryTent	$31,579	$2,428	$10,202	30.00%	$44,209
9102.03		------STEP 3 DEMO PART OF PIPE CORRIDOR	$153,764	$11,824	$49,676	30.00%	$215,264
9102.03.01		--------Remove Pipe Corridor	$84,216	$6,476	$27,208	30.00%	$117,900
9102.03.01		--------Demo and Box Pipe Corridor	$69,547	$5,348	$22,469	30.00%	$97,364
9102.04		------STEP 4 EXC TO BOTTOM OF VAULT	$59,191	$4,552	$19,123	30.00%	$82,866
9102.01.04		--------Ex to Bottom of Vault & Set Lagging	$59,191	$4,552	$19,123	30.00%	$82,866
9102.05		------STEP 5 DEMO PUMP PIT AND VAULT	$411,141	$31,617	$132,827	30.00%	$575,586
9102.02.01		--------Remove Pump Pit	$79,870	$6,142	$25,803	30.00%	$111,815
9102.02.02		--------Remove Tunnel	$39,935	$3,071	$12,902	30.00%	$55,908
9102.02.03		--------Remove Vault	$69,547	$5,348	$22,469	30.00%	$97,364
9102.02.04		--------Demo and Box Pit, Tunnel, and Vault	$179,707	$13,819	$58,058	30.00%	$251,584
9102.02.04		--------Excavate Below Vault	$42,083	$3,236	$13,596	30.00%	$58,916
9102.06		------STEP 6 REMOVE TENT AND FILL HOLE	$285,599	$21,963	$92,268	30.00%	$399,830
9102.03.01		--------Remove Access and Demo Tent	$8,150	$627	$2,633	30.00%	$11,409

Project Summary Report

Project Name: *WAG 3SFE-20 Hot Waste Tank Removal Phase II*

Project Location: ***INTEC***
Estimate Number: ***2977-E2***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Level	Group	Description	Estimate Subtotal	Escalation	Contingency	Contingency %	TOTAL
9102.03.03		-------Fill Excavation	$277,449	$21,336	$89,636	30.00%	$388,421
9300		--CONSTRUCTION SUPPORT	$206,963	$15,915	$66,863	30.00%	$289,741
9310		----CONSTRUCTION SUPPORT - RADTECH	$114,490	$8,804	$36,988	30.00%	$160,283
9320		----CONSTRUCTION SUPPORT - ES&H	$74,972	$5,765	$24,221	30.00%	$104,959
9330		----CONSTRUCTION SUPPORT - OTHER	$17,500	$1,346	$5,654	30.00%	$24,499
Total	Phase 2		$1,429,736	$109,947	$461,905	30.00%	$2,001,587

DETAIL ITEM REPORT

Project Name: ***WAG 3SFE-20 Hot Waste Tank Removal Phase II***

Project Location: ***INTEC***
Estimate Number: ***2977-E2***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Code Description	Contractor	Unit	Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
9101.1 GENERAL CONDITIONS											
Supervision	GEN	U.C. per Wk	24.00	40 960	CN-SUPR $40.00	1600 $38,400	0 $0	0 $0	0 $0	0 $0	1600 $38,400
Training	GEN	U.C. per Men	12.00	40 480	CN-LABR $31.58	1263.2 $15,158	0 $0	0 $0	0 $0	0 $0	1263.2 $15,158
Drill Mobilization & Demobilization	GEN	U.C. per Lot	1.00	0	CN-LABR	0 $0	2000 $2,000	0 $0	0 $0	0 $0	2000 $2,000
Pile Driver Mobilization & Demobilization	GEN	U.C. per Lot	1.00	0	CN-LABR	0 $0	2000 $2,000	0 $0	0 $0	0 $0	2000 $2,000
Subtotal						$53,558	$4,000	$0	$0	$0	$57,558
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$15,548	$1,161	$0	$0	$0	$16,709
Subtotal Estimate											**$74,268**
Escalation						$5,314	$397	$0	$0	$0	$5,711
Contingency						$22,326	$1,667	$0	$0	$0	$23,994
---Total 9101.1 GENERAL CONDITIONS				**1,440**		**$96,747**	**$7,226**	**$0**	**$0**	**$0**	**$103,972**
9101.2 CONDUCT OF OPERATIONS/CONDUCT OF MAINTENANCE											
WORKABILITY WALKDOWN - 1 HR/DAY X 8 WORKERS X 4 DAY/WK	GEN	U.C. per Wks	24.00	32 768	CN-LABR $31.58	1010.56 $24,253	0 $0	0 $0	0 $0	0 $0	1010.56 $24,253
POST JOB REVIEW	GEN	U.C. per LOT	1.00	10 10	CN-SUPR $40.00	400 $400	0 $0	0 $0	0 $0	0 $0	400 $400
Subtotal						$24,653	$0	$0	$0	$0	$24,653
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$7,157	$0	$0	$0	$0	$7,157
Subtotal Estimate											**$31,810**
Escalation						$2,446	$0	$0	$0	$0	$2,446
Contingency						$10,277	$0	$0	$0	$0	$10,277
---Total 9101.2 CONDUCT OF OPERATIONS/CONDUCT OF MAINTENANCE				**778**		**$44,534**	**$0**	**$0**	**$0**	**$0**	**$44,534**
9102.01.01 Demo Building and Slab											
CN-EQMD Remove Equipment W/Labors	EARTH	U.C. per hr	40.00	4 160	CN-LABR $31.58	126.32 $5,053	0 $0	0 $0	0 $0	0 $0	126.32 $5,053
CN-EQMD Demo Building W/Hoe	EARTH	U.C. per hr	80.00	1 80	CN-EQMD $34.75	34.75 $2,780	53.64 $4,291	0 $0	0 $0	0 $0	88.39 $7,071
CN-EQMD Demo Building W/Labors	EARTH	U.C. per hr	80.00	4 320	CN-LABR $31.58	126.32 $10,106	0 $0	0 $0	0 $0	0 $0	126.32 $10,106

DETAIL ITEM REPORT

Project Name: ***WAG 3SFE-20 Hot Waste Tank Removal Phase II***

Project Location: ***INTEC***
Estimate Number: ***2977-E2***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Code Description	Contractor		Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
9102.01.01 Demo Building and Slab											
CN-EQMD	EARTH	U.C. per hr		1	CN-EQMD	34.75	53.64	0	0	0	88.39
Demo Slab W/Hoe			40.00	40	$34.75	$1,390	$2,146	$0	$0	$0	$3,536
CN-EQMD	EARTH	U.C. per hr		4	CN-LABR	126.32	0	0	0	0	126.32
Demo Slab W/Labors			40.00	160	$31.58	$5,053	$0	$0	$0	$0	$5,053
	EARTH	U.C. per hr		1	CN-TRHV	33.48	31.45	0	0	0	64.93
Haul to CFA			40.00	40	$33.48	$1,339	$1,258	$0	$0	$0	$2,597
Subtotal						$25,720	$7,695	$0	$0	$0	$33,415
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		41.93%				$10,785	$3,227	$0	$0	$0	$14,012
Subtotal Estimate											**$47,427**
Escalation						$2,807	$840	$0	$0	$0	$3,647
Contingency						$11,794	$3,528	$0	$0	$0	$15,322
---Total 9102.01.01 Demo Building and Slab				**800**		**$51,107**	**$15,290**	**$0**	**$0**	**$0**	**$66,397**
9102.02.01 Set Soldier Piles											
	SPEC	U.C. per				0	0	0.01	0	0	0.01
***Drill 4 Holes x40' Deep			20.00	0		$0	$0	$0	$0	$0	$0
00E0830	SPEC	U.C. per hr		1	00E0830	0	132.73	0	0	0	132.73
Robins RRT35 Drill			80.00	80		$0	$10,618	$0	$0	$0	$10,618
CN-EQHV	SPEC	U.C. per hr		1	CN-EQHV	35.49	0	0	0	0	35.49
Equipment Operators, Crane Or Shovel			80.00	80	$35.49	$2,839	$0	$0	$0	$0	$2,839
CN-EQOL	SPEC	U.C. per hr		1	CN-EQOL	34.2	0	0	0	0	34.2
Equipment Operators, Oilers			80.00	80	$34.20	$2,736	$0	$0	$0	$0	$2,736
	SPEC	U.C. per ea				0	0	0.01	0	0	0.01
***Set 8 x 58 Piles			20.00	0		$0	$0	$0	$0	$0	$0
	SPEC	U.C. per lb				0	0	0.45	0	0	0.45
Purchase Piles			46,400.00	0		$0	$0	$20,880	$0	$0	$20,880
00E1310		U.C. per hr		1	00E1310	0	68.68	0	0	0	68.68
Grove RT522 20 tn Crane			80.00	80		$0	$5,494	$0	$0	$0	$5,494
CN-EQHV		U.C. per hr		1	CN-EQHV	35.49	0	0	0	0	35.49
Equipment Operators, Crane Or Shovel			80.00	80	$35.49	$2,839	$0	$0	$0	$0	$2,839

Project Name: ***WAG 3SFE-20 Hot Waste Tank Removal Phase II***

Project Location: ***INTEC***
Estimate Number: ***2977-E2***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Code Description	Contractor		Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
9102.02.01 Set Soldier Piles											
CN-PILE		U.C. per hr		2	CN-PILE	70.98	0	0	0	0	70.98
Pile Drivers			80.00	160	$35.49	$5,678	$0	$0	$0	$0	$5,678
Subtotal						$14,093	$16,113	$20,880	$0	$0	$51,086
Sales Tax						$0	$0	$1,044	$0	$0	$1,044
INEEL/Subcontractor Overheads		35.17%				$2,682	$5,108	$10,547	$0	$0	$18,336
Subtotal Estimate											**$70,466**
Escalation						$1,290	$1,632	$2,497	$0	$0	$5,419
Contingency						$5,419	$6,856	$10,490	$0	$0	$22,766
---Total 9102.02.01 Set Soldier Piles				**400**		**$23,484**	**$29,708**	**$45,458**	**$0**	**$0**	**$98,651**
9102.02.02 Ex and Set Lagging											
CN-EQMD	EARTH	U.C. per hr		1	CN-EQMD	34.75	53.64	0	0	0	88.39
Ex Pipe Corridor W/Hoe			120.00	120	$34.75	$4,170	$6,437	$0	$0	$0	$10,607
CN-EQMD	EARTH	U.C. per hr		4	CN-LABR	126.32	0	0	0	0	126.32
Ex Pipe Corridor W/Labors			120.00	480	$31.58	$15,158	$0	$0	$0	$0	$15,158
	EARTH	U.C. per mbf				0	0	700	0	0	700
Purchase Lagging			10.00	0		$0	$0	$7,000	$0	$0	$7,000
Subtotal						$19,328	$6,437	$7,000	$0	$0	$32,765
Sales Tax						$0	$0	$350	$0	$0	$350
INEEL/Subcontractor Overheads		41.93%				$8,105	$2,699	$3,082	$0	$0	$13,886
Subtotal Estimate											**$47,001**
Escalation						$2,110	$703	$802	$0	$0	$3,614
Contingency						$8,863	$2,952	$3,370	$0	$0	$15,185
---Total 9102.02.02 Ex and Set Lagging				**600**		**$38,406**	**$12,790**	**$14,605**	**$0**	**$0**	**$65,801**
9102.02.03 Erect DemoTent											
	GEN	U.C. per ea		100	CN-LABR	3158	5000	0	0	0	8158
Erect Tent			1.00	100	$31.58	$3,158	$5,000	$0	$0	$0	$8,158
Subtotal						$3,158	$5,000	$0	$0	$0	$8,158
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$917	$1,452	$0	$0	$0	$2,368
Subtotal Estimate											**$10,526**
Escalation						$313	$496	$0	$0	$0	$809
Contingency						$1,316	$2,084	$0	$0	$0	$3,401
---Total 9102.02.03 Erect DemoTent				**100**		**$5,705**	**$9,032**	**$0**	**$0**	**$0**	**$14,736**

DETAIL ITEM REPORT

Project Name: ***WAG 3SFE-20 Hot Waste Tank Removal Phase II***

Project Location: ***INTEC***
Estimate Number: ***2977-E2***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Code Description	Contractor		Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
9102.02.04 Erect EntryTent											
	GEN	U.C. per ea		150	CN-LABR	4737	5000	0	0	0	9737
Set Tent Floor			1.00	150	$31.58	$4,737	$5,000	$0	$0	$0	$9,737
	GEN	U.C. per ea		150	CN-LABR	4737	10000	0	0	0	14737
Erect Tent			1.00	150	$31.58	$4,737	$10,000	$0	$0	$0	$14,737
Subtotal						$9,474	$15,000	$0	$0	$0	$24,474
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$2,750	$4,355	$0	$0	$0	$7,105
Subtotal Estimate											**$31,579**
Escalation						$940	$1,488	$0	$0	$0	$2,428
Contingency						$3,949	$6,253	$0	$0	$0	$10,202
---Total 9102.02.04 Erect EntryTent				**300**		**$17,114**	**$27,096**	**$0**	**$0**	**$0**	**$44,209**
9102.03.01 Remove Pipe Corridor											
	GEN	U.C. per hr		3	CN-LABR	94.74	0	0	0	0	94.74
Demo Pipe			120.00	360	$31.58	$11,369	$0	$0	$0	$0	$11,369
	GEN	U.C. per day				0	0	0	2000	0	2000
Saw Cut Roof, Walls, and Slab			12.00	0		$0	$0	$0	$24,000	$0	$24,000
	GEN	U.C. per hr		1	CN-EQMD	34.75	165	0	0	0	199.75
Crane For Lift			80.00	80	$34.75	$2,780	$13,200	$0	$0	$0	$15,980
	GEN	U.C. per hr		4	CN-IRON	174	0	0	0	0	174
Labor for Lift			80.00	320	$43.50	$13,920	$0	$0	$0	$0	$13,920
Subtotal						$28,069	$13,200	$0	$24,000	$0	$65,269
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$8,148	$3,832	$0	$6,967	$0	$18,948
Subtotal Estimate											**$84,216**
Escalation						$2,785	$1,310	$0	$2,381	$0	$6,476
Contingency						$11,701	$5,503	$0	$10,005	$0	$27,208
---Total 9102.03.01 Remove Pipe Corridor				**760**		**$50,703**	**$23,844**	**$0**	**$43,353**	**$0**	**$117,900**
9102.03.01 Demo and Box Pipe Corridor											
	GEN	U.C. per day				0	0	0	2000	0	2000
Saw Cut Roof, Walls, and Slab			12.00	0		$0	$0	$0	$24,000	$0	$24,000
	GEN	U.C. per hr		1	CN-EQMD	34.75	165	0	0	0	199.75
Crane For Lift			80.00	80	$34.75	$2,780	$13,200	$0	$0	$0	$15,980

DETAIL ITEM REPORT

Project Name: ***WAG 3SFE-20 Hot Waste Tank Removal Phase II***

Project Location: ***INTEC***
Estimate Number: ***2977-E2***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Code Description	Contractor		Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
9102.03.01 Demo and Box Pipe Corridor											
	GEN	U.C. per hr		4	CN-IRON	174	0	0	0	0	174
Labor for Lift			80.00	320	$43.50	$13,920	$0	$0	$0	$0	$13,920
Subtotal						$16,700	$13,200	$0	$24,000	$0	$53,900
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$4,848	$3,832	$0	$6,967	$0	$15,647
Subtotal Estimate											**$69,547**
Escalation						$1,657	$1,310	$0	$2,381	$0	$5,348
Contingency						$6,962	$5,503	$0	$10,005	$0	$22,469
---Total 9102.03.01 Demo and Box Pipe Corridor				**400**		**$30,167**	**$23,844**	**$0**	**$43,353**	**$0**	**$97,364**
9102.01.04 Ex to Bottom of Vault & Set Lagging											
CN-EQMD	EARTH	U.C. per hr		1	CN-EQMD	34.75	53.64	0	0	0	88.39
Ex Vault W/Hoe			160.00	160	$34.75	$5,560	$8,582	$0	$0	$0	$14,142
CN-EQMD	EARTH	U.C. per hr		4	CN-LABR	126.32	0	0	0	0	126.32
Ex Vault W/Labors			160.00	640	$31.58	$20,211	$0	$0	$0	$0	$20,211
	EARTH	U.C. per mbf				0	0	700	0	0	700
Purchase Lagging			10.00	0		$0	$0	$7,000	$0	$0	$7,000
Subtotal						$25,771	$8,582	$7,000	$0	$0	$41,354
Sales Tax						$0	$0	$350	$0	$0	$350
INEEL/Subcontractor Overheads		41.93%				$10,807	$3,599	$3,082	$0	$0	$17,488
Subtotal Estimate											**$59,191**
Escalation						$2,813	$937	$802	$0	$0	$4,552
Contingency						$11,817	$3,935	$3,370	$0	$0	$19,123
---Total 9102.01.04 Ex to Bottom of Vault & Set Lagging				**800**		**$51,208**	**$17,053**	**$14,605**	**$0**	**$0**	**$82,866**
9102.02.01 Remove Pump Pit											
	GEN	U.C. per day				0	0	0	2000	0	2000
Saw Cut			16.00	0		$0	$0	$0	$32,000	$0	$32,000
	GEN	U.C. per hr		1	CN-EQMD	34.75	165	0	0	0	199.75
Crane For Lift			80.00	80	$34.75	$2,780	$13,200	$0	$0	$0	$15,980

DETAIL ITEM REPORT

Project Name: *WAG 3SFE-20 Hot Waste Tank Removal Phase II*

Project Location: *INTEC*
Estimate Number: *2977-E2*

Client: *C. J. Hurst*
Prepared By: *J. C. Grenz*
Estimate Type: *Planning*

Code Description	Contractor		Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
9102.02.01 Remove Pump Pit											
Labor for Lift	GEN	U.C. per hr	80.00	4 320	CN-IRON $43.50	174 $13,920	0 $0	0 $0	0 $0	0 $0	174 $13,920
Subtotal Sales Tax INEEL/Subcontractor Overheads		29.03%				$16,700 $0 $4,848	$13,200 $0 $3,832	$0 $0 $0	$32,000 $0 $9,290	$0 $0 $0	$61,900 $0 $17,970
Subtotal Estimate Escalation Contingency						$1,657 $6,962	$1,310 $5,503	$0 $0	$3,175 $13,339	$0 $0	**$79,870** $6,142 $25,803
---Total 9102.02.01 Remove Pump Pit				**400**		**$30,167**	**$23,844**	**$0**	**$57,804**	**$0**	**$111,815**
9102.02.02 Remove Tunnel											
Saw Cut	GEN	U.C. per day	8.00	0		0 $0	0 $0	0 $0	2000 $16,000	0 $0	2000 $16,000
Crane For Lift	GEN	U.C. per hr	*40.00*	1 *40*	CN-EQMD *$34.75*	34.75 *$1,390*	165 *$6,600*	0 $0	0 $0	0 $0	199.75 $7,990
Labor for Lift	GEN	U.C. per hr	40.00	4 160	CN-IRON $43.50	174 $6,960	0 $0	0 $0	0 $0	0 $0	174 $6,960
Subtotal Sales Tax INEEL/Subcontractor Overheads		29.03%				$8,350 $0 $2,424	$6,600 $0 $1,916	$0 $0 $0	$16,000 $0 $4,645	$0 $0 $0	$30,950 $0 $8,985
Subtotal Estimate Escalation Contingency						$829 $3,481	$655 $2,751	$0 $0	$1,588 $6,670	$0 $0	**$39,935** $3,071 $12,902
---Total 9102.02.02 Remove Tunnel				**200**		**$15,083**	**$11,922**	**$0**	**$28,902**	**$0**	**$55,908**
9102.02.03 Remove Vault											
Saw Cut Vault	GEN	U.C. per day	12.00	0		0 $0	0 $0	0 $0	2000 $24,000	0 $0	2000 $24,000
Crane For Lift (Vault)	GEN	U.C. per hr	80.00	1 80	CN-EQMD $34.75	34.75 $2,780	165 $13,200	0 $0	0 $0	0 $0	199.75 $15,980

DETAIL ITEM REPORT

Project Name: ***WAG 3SFE-20 Hot Waste Tank Removal Phase II***

Project Location: ***INTEC***
Estimate Number: ***2977-E2***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Code Description	Contractor		Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
9102.02.03 Remove Vault											
	GEN	U.C. per hr		4	CN-IRON	174	0	0	0	0	174
Labor for Lift (Vault)			80.00	320	$43.50	$13,920	$0	$0	$0	$0	$13,920
Subtotal						$16,700	$13,200	$0	$24,000	$0	$53,900
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$4,848	$3,832	$0	$6,967	$0	$15,647
Subtotal Estimate											**$69,547**
Escalation						$1,657	$1,310	$0	$2,381	$0	$5,348
Contingency						$6,962	$5,503	$0	$10,005	$0	$22,469
---Total 9102.02.03 Remove Vault				**400**		**$30,167**	**$23,844**	**$0**	**$43,353**	**$0**	**$97,364**
9102.02.04 Demo and Box Pit, Tunnel, and Vault											
	GEN	U.C. per day				0	0	0	2000	0	2000
Saw Cut Vault Lid			36.00	0		$0	$0	$0	$72,000	$0	$72,000
	GEN	U.C. per hr		1	CN-EQMD	34.75	165	0	0	0	199.75
Crane For Lift (Vaul)			180.00	180	$34.75	$6,255	$29,700	$0	$0	$0	$35,955
	GEN	U.C. per hr		4	CN-IRON	174	0	0	0	0	174
Labor for Lift (Vault)			180.00	720	$43.50	$31,320	$0	$0	$0	$0	$31,320
Subtotal						$37,575	$29,700	$0	$72,000	$0	$139,275
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$10,908	$8,622	$0	$20,902	$0	$40,432
Subtotal Estimate											**$179,707**
Escalation						$3,728	$2,947	$0	$7,144	$0	$13,819
Contingency						$15,663	$12,381	$0	$30,014	$0	$58,058
---Total 9102.02.04 Demo and Box Pit, Tunnel, and Vault				**900**		**$67,875**	**$53,650**	**$0**	**$130,059**	**$0**	**$251,584**
9102.02.04 Excavate Below Vault											
CN-EQMD	EARTH	U.C. per hr		1	CN-EQMD	34.75	53.64	0	0	0	88.39
Ex Vault W/Hoe			120.00	120	$34.75	$4,170	$6,437	$0	$0	$0	$10,607
CN-EQMD	EARTH	U.C. per hr		4	CN-LABR	126.32	0	0	0	0	126.32
Ex Vault W/Labors			120.00	480	$31.58	$15,158	$0	$0	$0	$0	$15,158
	EARTH	U.C. per mbf				0	0	700	0	0	700
Purchase Lagging			5.00	0		$0	$0	$3,500	$0	$0	$3,500

Code Description	Contractor		Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
9102.02.04 Excavate Below Vault											
	EARTH	U.C. per loads				0	0	0	35	0	35
Haul Waste to ICDF			6.00	0		$0	$0	$0	$210	$0	$210
Subtotal						$19,328	$6,437	$3,500	$210	$0	$29,475
Sales Tax						$0	$0	$175	$0	$0	$175
INEEL/Subcontractor Overheads		41.93%				$8,105	$2,699	$1,541	$88	$0	$12,433
Subtotal Estimate											**$42,083**
Escalation						$2,110	$703	$401	$23	$0	$3,236
Contingency						$8,863	$2,952	$1,685	$96	$0	$13,596
---Total 9102.02.04 Excavate Below Vault				**600**		**$38,406**	**$12,790**	**$7,302**	**$417**	**$0**	**$58,916**
9102.03.01 Remove Access and Demo Tent											
	GEN	U.C. per ea		100	CN-LABR	3158	0	0	0	0	3158
Demo Tent			2.00	200	$31.58	$6,316	$0	$0	$0	$0	$6,316
Subtotal						$6,316	$0	$0	$0	$0	$6,316
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		29.03%				$1,834	$0	$0	$0	$0	$1,834
Subtotal Estimate											**$8,150**
Escalation						$627	$0	$0	$0	$0	$627
Contingency						$2,633	$0	$0	$0	$0	$2,633
---Total 9102.03.01 Remove Access and Demo Tent				**200**		**$11,409**	**$0**	**$0**	**$0**	**$0**	**$11,409**
9102.03.03 Fill Excavation											
CN-EQMD	EARTH	U.C. per hr		1	CN-EQMD	34.75	53.64	0	0	0	88.39
Backfill Vault (FEL)			120.00	120	$34.75	$4,170	$6,437	$0	$0	$0	$10,607
CN-EQMD	EARTH	U.C. per hr		4	CN-LABR	126.32	0	0	0	0	126.32
Backfill Vault (Labors)			120.00	480	$31.58	$15,158	$0	$0	$0	$0	$15,158
00E2050	EARTH	U.C. per hr		1	00E2050	0	31.38	0	0	0	31.38
4000 gal Water Truck			120.00	120		$0	$3,766	$0	$0	$0	$3,766
00E0620	EARTH	U.C. per hr		34.75	CN-EQMD	1207.563	12	0	0	0	1219.563
Bowmag BW90 Compactor			120.00	4,170	$34.75	$144,908	$1,440	$0	$0	$0	$146,348
00E2010	EARTH	U.C. per hr		1	00E2010	0	31.45	0	0	0	31.45
12 cy End Dump			240.00	240		$0	$7,548	$0	$0	$0	$7,548

DETAIL ITEM REPORT

Project Name: ***WAG 3SFE-20 Hot Waste Tank Removal Phase II***

Project Location: ***INTEC***
Estimate Number: ***2977-E2***

Client: ***C. J. Hurst***
Prepared By: ***J. C. Grenz***
Estimate Type: ***Planning***

Code Description	Contractor		Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
9102.03.03 Fill Excavation											
	EARTH	U.C. per hr		3	CN-TRHV	100.44	0	0	0	0	100.44
Teamsters			120.00	360	$33.48	$12,053	$0	$0	$0	$0	$12,053
Subtotal						$176,289	$19,190	$0	$0	$0	$195,479
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		41.93%				$73,923	$8,047	$0	$0	$0	$81,970
Subtotal Estimate											**$277,449**
Escalation						$19,241	$2,095	$0	$0	$0	$21,336
Contingency						$80,836	$8,800	$0	$0	$0	$89,636
---Total 9102.03.03 Fill Excavation				**5,130**		**$350,289**	**$38,132**	**$0**	**$0**	**$0**	**$388,421**
9310 CONSTRUCTION SUPPORT - RADTECH											
U60760	BBWI-A	U.C. per wks		80	U60760	4169.951	0	0	0	0	4169.951
RADIOLOGICAL CONTROL TECH			24.00	1,920	$52.12	$100,079	$0	$0	$0	$0	$100,079
Subtotal						$100,079	$0	$0	$0	$0	$100,079
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		14.40%				$14,411	$0	$0	$0	$0	$14,411
Subtotal Estimate											**$114,490**
Escalation						$8,804	$0	$0	$0	$0	$8,804
Contingency						$36,988	$0	$0	$0	$0	$36,988
---Total 9310 CONSTRUCTION SUPPORT - RADTECH				**1,920**		**$160,283**	**$0**	**$0**	**$0**	**$0**	**$160,283**
9320 CONSTRUCTION SUPPORT - ES&H											
S0871A	BBWI-A	U.C. per wks		40	S0871A	2730.64	0	0	0	0	2730.64
INDUSTRIAL HYGIENE			24.00	960	$68.27	$65,535	$0	$0	$0	$0	$65,535
Subtotal						$65,535	$0	$0	$0	$0	$65,535
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		14.40%				$9,437	$0	$0	$0	$0	$9,437
Subtotal Estimate											**$74,972**
Escalation						$5,765	$0	$0	$0	$0	$5,765
Contingency						$24,221	$0	$0	$0	$0	$24,221
---Total 9320 CONSTRUCTION SUPPORT - ES&H				**960**		**$104,959**	**$0**	**$0**	**$0**	**$0**	**$104,959**
9330 CONSTRUCTION SUPPORT - OTHER											
	BBWI-A	U.C. per ea				0	0	0	500	0	500
Soil Samples for Rad			25.00	0		$0	$0	$0	$12,500	$0	$12,500

DETAIL ITEM REPORT

Project Name: *WAG 3SFE-20 Hot Waste Tank Removal Phase II*

Project Location: *INTEC*
Estimate Number: *2977-E2*

Client: *C. J. Hurst*
Prepared By: *J. C. Grenz*
Estimate Type: *Planning*

Code Description	Contractor		Qty	Hrs	Resource	Labor	Equipment	Material	Subcontractor	Other	TOTAL
9330 CONSTRUCTION SUPPORT - OTHER											
	BBWI-A	U.C. per ea				0	0	0	1000	0	1000
Soil Samples for Rad			5.00	0		$0	$0	$0	$5,000	$0	$5,000
Subtotal						$0	$0	$0	$17,500	$0	$17,500
Sales Tax						$0	$0	$0	$0	$0	$0
INEEL/Subcontractor Overheads		0.00%				$0	$0	$0	$0	$0	$0
Subtotal Estimate											**$17,500**
Escalation						$0	$0	$0	$1,346	$0	$1,346
Contingency						$0	$0	$0	$5,654	$0	$5,654
--Total 9330 CONSTRUCTION SUPPORT - OTHER				**0**		**$0**	**$0**	**$0**	**$24,499**	**$0**	**$24,499**
Subtotal Phase 2						$667,398	$177,554	$38,380	$209,710	$0	$1,093,042
Sales Tax						$0	$0	$1,919	$0	$0	$1,919
INEEL/Subcontractor Overheads						$202,485	$58,212	$18,252	$55,826	$0	$334,774
Subtotal Estimate											$1,429,736
Escalation						$66,894	$18,130	$4,503	$20,420	$0	$109,947
Contingency						$281,033	$76,169	$18,916	$85,787	$0	$461,905
Total Phase 2				17,088		$1,217,810	$330,065	$81,970	$371,742	$0	**$2,001,587**

Appendix D

Schedule

Appendix D

Schedule

This schedule assumes that obtaining a sample through the 2-in. vent line will be possible. If a sample cannot be obtained through the vent line, a manned entry into the tank vault to take a sample directly from the tank will be necessary. Since this is a more complex and time-consuming activity, including full-scale mockups of the sampling effort, a manned entry is anticipated to yield results of analysis approximately January 31, 2003. If characterization results are not available until late January, this information may not be incorporated until after the draft RD/RA Work Plan has been submitted to the Agencies.

ID	Task Name	Duration	Start	Finish
1	Approval to Start Vent Line Sampling	0 days	Wed 6/19/02	Wed 6/19/02
2	Preparation for Sampling Through Vent Line	68 days	Wed 6/19/02	Fri 9/20/02
3	Sampling Through SFE-20 Vent Line	5 days	Mon 9/23/02	Fri 9/27/02
4	Laboratory Analysis of Sample(s)	40 days	Mon 9/30/02	Fri 11/22/02
5	Data Validation of Sample Report	21 days	Mon 11/25/02	Mon 12/23/02
6				
7	Begin Group 7 RD/RA WP	0 days	Thu 3/21/02	Thu 3/21/02
8	**Prepare Title I Design**	**127 days**	**Thu 3/21/02**	**Fri 9/13/02**
9	Prepare/Review/Revise Title I Design	87 days	Thu 3/21/02	Fri 7/19/02
10	Agency Review Title I Design	19 days	Mon 7/22/02	Thu 8/15/02
11	Resolve Agency Comments to Draft Title I	22 days	Fri 8/16/02	Fri 9/13/02
12	Submit Final Title I Design to Agencies	0 days	Fri 9/13/02	Fri 9/13/02
13				
14	**Develop Supporting RD/RA WP Documents**	**90 days**	**Mon 7/22/02**	**Fri 11/22/02**
15	Prepare WMP	60 days	Mon 7/22/02	Fri 10/11/02
16	Prepare FSP	60 days	Mon 7/22/02	Fri 10/11/02
17	Prepare HASP	30 days	Mon 10/7/02	Fri 11/15/02
18	Prepare Draft Title II Design/Specs.	70 days	Mon 8/19/02	Fri 11/22/02
19	Prepare Treatability Test WP	30 days	Mon 7/22/02	Fri 8/30/02
20	Prepare SWPPP	30 days	Mon 9/30/02	Fri 11/8/02
21	Prepare Const. Schedule	15 days	Mon 10/21/02	Fri 11/8/02
22	Prepare Construction Cost Estimate	25 days	Mon 10/7/02	Fri 11/8/02
23	Prepare Hazard Assessment Document / ASA	55 days	Mon 9/9/02	Fri 11/22/02
24				
25	**SFE-20 RD/RA Work Plan**	**226 days**	**Mon 9/16/02**	**Mon 7/28/03**
26	Prepare RD/RA WP	47 days	Mon 9/16/02	Tue 11/19/02
27	Incorporate RD/RA WP Supporting Documents	33 days	Mon 11/25/02	Wed 1/8/03
28	ORB/DOE Review RD/RA WP (& Supporting Docs.)	10 days	Thu 1/9/03	Wed 1/22/03
29	Revise RD/RA WP (& Supporting Docs.)	25 days	Thu 1/23/03	Wed 2/26/03
30	Draft RD/RA WP To Agencies for Rev.	0 days	Wed 2/26/03	Wed 2/26/03
31	Agency Review of Draft RD/RA WP	32 days	Thu 2/27/03	Fri 4/11/03
32	Incorp. Agency Comm. Drft. RD/RA WP	32 days	Mon 4/14/03	Tue 5/27/03
33	Drft Final RD/RA WP To Agencies	0 days	Tue 5/27/03	Tue 5/27/03
34	Agency Finalization of Draft Final RD/RA WP	22 days	Wed 5/28/03	Thu 6/26/03
35	Incorp. Agency Comm. Drft. Final RD/RA WP	22 days	Fri 6/27/03	Mon 7/28/03
36	RD/RA WP Final	0 days	Mon 7/28/03	Mon 7/28/03

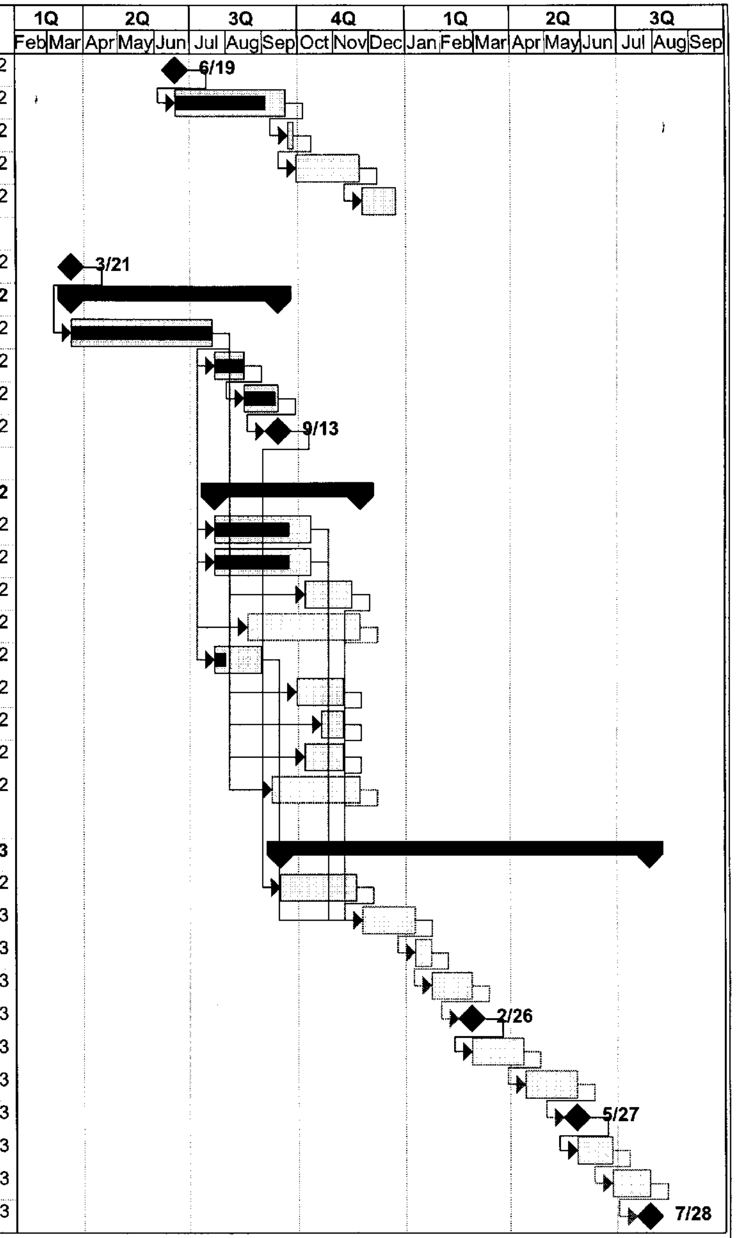


Figure D-1. Remedial design/remedial action schedule for VES-SFE-20 Hot Waste Tank.